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UNITED STATES DEPARTMENT OF THE INTERIOR

*ANNUAL REPORT OF THE
COMMISSIONER OF
RECLAMATION*

*TO THE SECRETARY OF THE INTERIOR
FOR FISCAL YEAR ENDED JUNE 30, 1931*

UNITED STATES DEPARTMENT OF THE INTERIOR

RAY LYMAN WILBUR, *Secretary*

BUREAU OF RECLAMATION

ELWOOD MEAD, *Commissioner*

THIRTIETH ANNUAL REPORT
OF THE
COMMISSIONER OF RECLAMATION

*Transmitted to Congress in pursuance of the Act of June 17, 1902
(32 Stat. 388)*

FOR THE
FISCAL YEAR ENDED JUNE 30, 1931



UNITED STATES
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THIRTIETH ANNUAL REPORT OF THE COMMISSIONER OF RECLAMATION

WASHINGTON, D. C., *September 1, 1931.*

SIR: The area irrigated in 1930 with water from Government works was 2,790,856 acres, an increase of 72,726 acres over that of 1929.

The area cropped was 2,805,460 acres, an increase of 100,220 acres.

The total value of crops was \$119,661,820, a decrease of \$41,518,060 compared with 1929, owing to the agricultural depression and the prevailing low prices for practically all crops.

Since water was first available in 1906 the cumulative value of crops grown on land irrigated from Government works amounted to \$1,761,929,500.

Construction payments in the fiscal year 1931 were \$4,794,833.32, an increase of \$1,563,301.25 compared with the previous year.

Payments for operation and maintenance were \$1,426,138.04, a decrease of \$224,958.72 compared with the previous year.

Total payments amounted to \$6,220,971.36 compared with \$4,882,628.83 in 1930, an increase of \$1,338,342.53.

Income to the bureau from all sources during the fiscal year was \$10,367,666.56, or \$1,332,158.21 more than in the previous year.

The operation expense for the year was \$1,735,784.91, a decrease from the previous year of \$50,413.74

Excess of operation and maintenance expense over receipts for the period amounted to \$309,646.87, compared with an excess of expense over receipts of \$135,101.89 for the previous year.

The amount available for construction was \$11,860,000.

The amount expended on construction was \$10,843,700 compared with \$8,611,400 the previous year.

Works now under construction under the 10-year program involve an ultimate expenditure of about \$80,000,000. This provides for the completion of old projects and the construction of new projects under the reclamation act authorized by Congress. The Boulder Canyon project is being constructed with funds and under authority separate from the reclamation act.

The bureau has expended for surveys and investigations, construction, operation and maintenance, and incidental operations, \$263,400,-000, distributed approximately as follows:

Surveys and investigations not allocated to primary projects-----	\$3, 100, 000
Construction of irrigation works, etc-----	215, 800, 000
Operation and maintenance-----	34, 300, 000
Incidental operations, plant and equipment, etc-----	10, 200, 000
Total-----	263, 400, 000

As the settlers refund to the Government the cost of construction and operation the fund is replenished and money becomes available for the construction of new projects. Regular repayments are being made to the Government by 22 projects, and only one completed project has not yet reached a repayment status. Accretions to the revolving fund come from the sale of public lands, the receipts from which source last year amounted to \$635,290.72, and from royalties from oil leases, which last year added \$2,098,855.96 to the fund.

Of the money that has been made available for Federal reclamation work, more than 37 per cent has come from repayments by the water users and collections from other sources. During recent years and in the future the amounts available for expenditure have been and will be more and more dependent upon the revolving feature of the fund, owing to the decrease in accretions from the sale of public land and from royalties from oil leases.

In 1931 there were on the projects 40,354 irrigated farms, with a population of 165,956; 213 cities and towns, with a population of 472,723; 688 schools, 724 churches, and 120 banks, with deposits of \$134,261,170 and 226,014 project and nonproject depositors.

ONE YEAR'S ACHIEVEMENTS ON BOULDER CANYON PROJECT

The work accomplished on the Boulder Canyon project during the last fiscal year is impressive in its magnitude and because of the speed which has been made in transforming a desert waste into a hive of construction activity.

The project was formally inaugurated with the approval by President Hoover on July 3, 1930, of the first appropriation of \$10,660,000. This was increased on February 14, 1931, by a further appropriation of \$15,000,000.

A temporary headquarters office for the construction engineer and his force was opened in Las Vegas, and will be used until the winter of 1931 when a permanent office will be established in Boulder City.

On March 11, 1931, Secretary Wilbur signed the award of contract to the Six Companies (Inc.), of San Francisco, the low bidder, for the construction of the 730-foot Hoover Dam, the power plant (except installation of machinery), and all appurtenant works, at the bid price of \$48,890,995. The contract price does not include the furnishing of materials which enter into the completed work, such as cement, reinforcing steel, pipe and fittings, conduits, valves, gates and hoists, and structural steel. The total estimated cost of the work covered by the contract, including all materials, is about \$76,000,000. The power machinery and its installation will cost an additional \$15,000,000.

A contract was entered into with the Union Pacific system, under which a 22.7-mile branch line was constructed by and at the expense

of the company from its main line near Las Vegas to Boulder City. The branch line is constructed with 90-pound rails and is ballasted throughout. Ten tracks with a total capacity of 600 cars have been built at the interchange yard at Boulder City.

Under a contract with the Southern Sierras Power Co., of Riverside, Calif., to furnish power for construction purposes, the company constructed a transmission line 235 miles long from Victorville, Calif., to Hoover Dam site and erected a substation at the terminus of the line. The contract provides for the delivery of a maximum of 15,000 kilowatts at an average price of about 1¾ cents per kilowatt-hour. Power was being delivered over this line at the end of the fiscal year.

The General Construction Co., of Seattle, Wash., was awarded a contract for the construction of a 24-foot oil-macadam highway, 7 miles long, from Boulder City to Hoover Dam site, and at the end of the fiscal year the highway had been practically completed.

A contract was awarded to the Lewis Construction Co., of Los Angeles, Calif., for the construction of a railroad 10 miles long, connecting the end of the Las Vegas-Boulder City line with the dam site. This road will be completed during the summer of 1931 and turned over to the Six Companies (Inc.) for operation. The contractor for the dam is also constructing 20 miles of railroad, one branch running from the Government railroad down Hemenway Wash to the boat landing and thence along the Nevada canyon wall to the outlets of the diversion tunnels, and a second branch, 12 miles long, to the deposit of sand and gravel in Arizona.

The 9-mile pipe line of a water system to provide for 2,500 people was practically completed, and pumps were being installed to lift the water 2,000 feet from the river to Boulder City.

Construction of six 3-room and six 4-room cottages for Government employees was well under way.

Bids were opened on June 30 for work at Boulder City to include street, alley, parking area, and sidewalk grading; street paving; street and parking area surfacing; curbs and gutters; sidewalks; sanitary sewers; and water-distribution system.

Plans were completed and bids were to be opened in July for the construction of an administrative building, dormitory and guest house, post-office building, and about 60 residences.

The Six Companies (Inc.) had erected office buildings, mess houses, dormitories, and 4-room houses for married employees, and were actively engaged on the 2-year work of excavating the four tunnels, each 50 feet in diameter and with a total length of 3.1 miles, through which the Colorado River will be diverted during the period of construction of the dam. They were also engaged in preparing designs of the gravel screening and concrete-mixing plants, the installation of

equipment and machinery, the layout of cable-ways, and numerous other matters to be determined in a contract of this size.

In order to accomplish this transformation plans and specifications had to be prepared at unprecedented speed, requiring the closest coordination of the Washington and Denver offices to avoid any delay in their preparation, printing, and distribution to prospective bidders. That the work was done in a minimum of time is a tribute to the reclamation organization.

THE TOWN OF BOULDER CITY

Probably no embryo town has ever received the widespread publicity that has resulted from the announcement that the Government planned to construct Boulder City in connection with the building of Hoover Dam.

A city planner and landscape architect was employed to lay out the town according to the latest approved standards. Three main arterial highways are the basis of the street plans, the center one being the axis of the town and all three centering on the Government administration building. At right angles to these boulevards is the main business street, with all other streets connecting the boulevards parallel to the main street. Residential streets parallel the three boulevards.

Parking space is provided by open plazas in the downtown business blocks, no parking being allowed on the streets. In the residential areas open plazas have been provided for small parks and playgrounds.

Thousands of letters of inquiry were received from all parts of the United States, asking about business and residential opportunities in the new town. In order to supervise and control the various industrial activities permits will be issued to engage in specified lines of business, and lots in the town will be leased for this purpose. The work of handling the issuance of permits and leases was intrusted to Hon. Louis C. Cramton, formerly chairman of the Subcommittee on Appropriations for the Interior Department of the House of Representatives.

On June 30, 1931, Mr. Cramton reported that 295 formal applications had been filed for business permits in Boulder City, representing 36 States and 62 kinds of business.

CONSTRUCTION DURING THE FISCAL YEAR

Two important dams have been completed during the year—the Echo Dam on the Salt Lake Basin project, Utah, and the Deadwood Dam on the Boise project, Idaho.

Plans and specifications were also prepared for construction of the Cle Elum Dam on the storage division of the Yakima project, Washington, and the Thief Valley Dam on the Baker project, Oregon—both

of these structures to be advertised for bids early in the ensuing fiscal year.

The Denver office also designed and wrote specifications for the Madden Dam and power plant, Canal Zone, Panama, on which the Panama Canal will start construction the latter part of 1931.

A report was also made on the design for a concrete-arch dam located on Cat Creek, near the Ammunition Depot, Hawthorne, Nev., for the Bureau of Yards and Docks, Navy Department.

The 405-foot Owyhee storage dam on the Owyhee project, Oregon, was under construction and excellent progress was made, so that the dam was 72 per cent completed at the end of the fiscal year.

An outstanding event in the year's work was the commencement of construction on the Boulder Canyon project, on the Colorado River. A contract was let for two of the project features, the Hoover Dam and power plant.

Canals, laterals, and structures to distribute water from the Easton diversion dam to 72,000 acres on the Kittitas division of the Yakima project, Washington, were practically completed. Canal construction was continued on the Gooding division of the Minidoka project, Idaho; the Vale project, Oregon; the Sun River project, Montana; the Klamath project, Oregon-California; and tunnel construction on the Owyhee project, Oregon.

Drainage ditches were constructed on the Belle Fourche project, South Dakota; the Lower Yellowstone project, Montana-North Dakota; the Shoshone project, Wyoming; the Rio Grande project, New Mexico-Texas; and the Klamath project, Oregon-California.

During the fiscal year 476 miles of canals, ditches, and drains were completed, making a total length to date of 17,467 miles. At the end of the fiscal year tunnels numbered 132 with a total length of 40 miles. Canal structures numbered 165,427, of which 3,958 were built during the year; bridges 12,194 with a total length of 56 miles; culverts, 15,787; and flumes 5,540. The bureau laid 4,436,952 feet or 840 miles of pipe. There were 1,461 miles of road constructed, 117 miles of railroad, 4,011 miles of telephone lines, and 3,226 miles of transmission lines. The various construction activities have involved the excavation of 303,792,172 cubic yards of earth and rock. In building dams and other irrigation structures there have been placed 4,776,359 cubic yards of concrete, involving the use of 5,350,393 barrels of cement. Riprap totaled 2,570,254 cubic yards; paving 1,974,756 square yards; and gunite 912,096 square yards.

NEED FOR ADDITIONAL CONSTRUCTION FUNDS

During the winter of 1930-31 Federal reclamation faced a crisis. Construction under the large contracts on the Owyhee, Vale, and Kittitas projects was being carried on at an almost unprecedented

rate owing to the open winter and unusually favorable weather conditions. Repayments from water users had fallen off as a result of the negotiation of adjustment contracts extending the period of payment on several projects. Money needed to pay workers and complete important contracts was rapidly being exhausted and a point was being reached where it would be necessary to shut down construction and discharge from 1,000 to 1,500 employees. This was to be avoided if at all possible.

A presentation of the situation was made to the committees of Congress with the request that a moratorium be granted on the repayment to the General Treasury of \$1,000,000 a year on the bond loan of \$10,000,000, on which \$11,000,000 had been repaid. A further request was also made for a loan from the Treasury of \$5,000,000 to meet contract obligations and complete construction urgently needed to make it possible to deliver water to land struggling with an inadequate supply.

As a result laws were enacted authorizing a moratorium of two years on the repayment of the bond loan and also authorizing the loan of \$5,000,000. Beginning July 1, 1932, payments will have to be resumed on the \$20,000,000 loan at the rate of \$1,000,000 a year, and on July 1, 1933, repayment of the \$5,000,000 loan will commence, also at the rate of \$1,000,000 a year, necessitating yearly payments from the construction income of the bureau of \$2,000,000 for the ensuing five years. These payments will result in a material reduction in the yearly construction revenue of the bureau, which will all be absorbed for the next 15 years in completing works now authorized.

It is important for the future welfare of the public-land States that it be more generally appreciated that the reclamation fund, established for the development of those States, can accomplish this great work only as it has money available to carry on construction of needed feasible projects. If payments due the fund from existing projects are deferred or if income from power, logically belonging to the fund, is diverted to the benefit of individuals on projects favorably situated for power development, the general progress of development is to that extent handicapped.

REHABILITATION OF BITTER ROOT PROJECT, MONTANA

The Bitter Root project, Montana, is a private project of 20,000 acres in Ravalli County. Irrigation works were constructed in 1910 at an estimated cost of \$2,000,000. The original company failed, an irrigation district was organized, and in 1923 sold \$600,000 in bonds bearing interest at 6 per cent to purchase the irrigation system for \$75,000 and replace about half of the old flumes, which had become unsafe. Further financial difficulties resulted in the district requesting the Government to purchase for about \$500,000 its outstanding bonds

and warrants and reconstruct flumes on the main canal estimated to cost \$254,144.

At the request of the landowners and other interests in the Bitter Root Valley, the Bureau of Reclamation made an investigation of conditions there in 1929 and found a well-developed agricultural community that had made an honest effort to meet its outstanding obligations and raise sufficient funds to operate and maintain its irrigation system. In an effort to do this the annual charge per acre had been increased from \$3.74 in 1925 to \$5 in 1927 and 1928, but with practically no increase in the total annual receipts. It was evident that the landowners would have to be given some relief in annual payments, as the burden was becoming too heavy, and the flumes had deteriorated to the point where their replacement was essential.

The landowners suggested the possibility of obtaining a 4 per cent Federal loan to be used in liquidating their bonded and other indebtedness and in reconstructing the canal system. As a result Congress passed the act of July 3, 1930, authorizing an appropriation of \$750,000 for the rehabilitation of the Bitter Root project, with the proviso that the outstanding indebtedness must be liquidated at not to exceed 75 cents on the dollar.

The Interior Department appropriation act of February 14, 1931, contained an item of \$550,000 for liquidating all bonded and other indebtedness of the project and for necessary construction, betterment, and repair work in accordance with the act of July 3, 1930.

Active steps were at once taken by the district to liquidate the bonded and other outstanding indebtedness on the basis of not to exceed 75 per cent of the principal and 75 per cent of the accrued interest to March 4, 1931, by obtaining the consent of the bondholders to these terms, and the deposit of outstanding bonds with a designated depository.

All except five bonds of \$500 each were located and deposited, and on May 18, 1931, the Comptroller General ruled that this represented substantial compliance with the law "if the amount necessary to retire the five bonds on the same basis that the other indebtedness of the irrigation district are to be liquidated under the said act of July 3, 1930, is set aside and remains unexpended in the appropriation to take care of such bonds in the event the owners present the same, and, in addition to this, there be procured a bond of indemnity or such other security as will guarantee that neither the Government nor the irrigation district will ever have to pay any greater amount on account of said five bonds than 75 per cent of principal and accrued interest if now paid with the other bonds now being liquidated."

At the end of the fiscal year active steps were being taken by the district to comply with all requirements in order that this work of rehabilitating the project might begin at the earliest possible date.

*ADJUSTMENT CONTRACTS**SALT RIVER PROJECT, ARIZONA*

The Salt River Valley Water Users' Association submitted a proposal to pay on their construction account in one installment \$3,600,000, leaving unpaid approximately \$1,300,000 to be paid in 27 annual installments of about \$48,000. Their proposal was approved by the Secretary May 6, 1930. Shortly thereafter they found it necessary to modify this plan and a contract was prepared providing for the payment of \$1,851,232.60 on or before June 30, 1930, which sum is made up of the annual installments due December 1, 1929, 1930, and 1931, with interest and penalties, as provided in contracts heretofore executed. The association expected to secure necessary funds through the sale of a bond issue of \$3,000,000, which was finally authorized by vote of the water users on September 16. It was found impracticable to accomplish the desired result within the time contemplated, and it became necessary to extend the time of payment to June 15, 1931. Payment of the above sum was made in four installments, the first in January and the last on June 3, 1931. There remains a deferred obligation due the United States of approximately \$3,050,000 plus interest, which under the terms of the adjustment contract is to be paid in 20 annual installments, beginning December 1, 1932, the first 5 being \$152,490 and approximately \$217,797 for the remaining 15 years.

YUMA PROJECT, ARIZONA-CALIFORNIA

Economic conditions resulting from the extremely low price of cotton and the failure of three out of four of the project banks made it impossible for the water users to continue the payment of construction charges under the 20-year plan. An adjustment contract was executed February 5, 1931, which provided that all construction and supplemental construction charges to become due after the year 1930 shall be extended over a period of years so as to allow not more than 30 years from and including the first payment matured under the original water-right applications. Delinquent construction charges as of December 31, 1930, were extended over a period of 10 years with equal annual installments beginning December 1, 1936, interest at 6 per cent to be paid annually beginning with the year 1931. Delinquent operation and maintenance charges plus penalties and interest to December 31, 1930, were made payable in five installments beginning December 1, 1931. Beginning with the year 1931 operation and maintenance charges are to be paid semiannually in advance. The contract provides that the agreed charges are a general obligation of the association and payment in full is to be made by the association regardless of the default of the individual in the payment of any charge.

GRAND VALLEY PROJECT, COLORADO

At the close of the fiscal year the contract of January 4, 1928, was confirmed by the court and executed by the First Assistant Secretary on June 27, 1931. The contract provides for graduated payments of the construction charge over a period of 40 years, beginning in 1927, the advance payment of operation and maintenance charges, and, as proposed to be amended, for extending the time for taking over the project by the water users from January 1, 1932, to January 1, 1937.

ORCHARD MESA DIVISION, GRAND VALLEY PROJECT, COLORADO

An adjustment contract was negotiated with the Orchard Mesa division of the Grand Valley project, Colorado, providing for the amendment of the contract of February 18, 1922, to permit the district to make payment of construction charges in graduated installments over a period of 40 years, the initial payments being comparatively small, and gradually increasing in amount as the payment period progresses; to authorize the levy of heavier assessments upon good land than upon the poorer land; and to provide for the collection of operation and maintenance charges in advance after 1935. The contract was still pending at the close of the fiscal year.

UNCOMPAHGRE PROJECT, COLORADO

The recommendations of the committee, appointed at the conference in Denver in February 1930, to consider economic conditions on the Uncompahgre project, Colorado, and to suggest possible adjustments of the contract of April 8, 1927, with a view to the successful development of the project, were incorporated largely in the act of January 31, 1931, as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That if the Uncompangre Valley Water Users' Association shall, under the contract of April 8, 1927, between the United States and the association, on or before January 1, 1932, take over the operation, maintenance, and control of the entire Uncompahgre reclamation project, Colorado, the Secretary of the Interior is hereby authorized to enter into an amendatory contract with the said association which shall provide as follows:

First. All construction and operation and maintenance charges (exclusive of any operation and maintenance charges required to be paid by the association for the operation and maintenance of the project for the calendar year 1930) that were or shall be due and unpaid under said contract of 1927 on December 31, 1930, including the then unpaid deferred charges under articles 17 (b) and (d) of said contract (without interest and penalties on such deferred accounts) and the construction charge that becomes due on December 1, 1931, under said contract, may be included in and made payable as part of the project supplemental construction charge hereinafter mentioned. Interest and penalties heretofore paid on deferred charges under articles 17 (b) and (d) shall be remitted and credited against the association's obligation for supplemental construction.

Second. During each of the years 1932 to 1937, both inclusive, the association shall have the right to expend for the construction of a drainage system such portion of the construction charge payable to the United States under said contract of 1927, as said association may consider necessary and as may be provided for by plans prepared by the association and approved by or on behalf of the Secretary of the Interior, the moneys so expended to be secured from construction charge assessments to be made to meet the regular construction charge installments that become due and payable under the said contract of 1927 on December 1 of the years 1931 to 1936, inclusive. The amounts so expended by the association for drainage each calendar year from December 1 to November 30, for six years, beginning with December 1, 1931, shall be credited to the annual construction charge that becomes due annually on December 1 of each year during the period of 1932 to 1937, both inclusive, the payment of the construction charges for which it is so substituted being in each case postponed to be paid later as a part of the supplemental construction charges authorized in item 3 hereof. Should the amounts so expended and credited annually be less than the annual construction charge for the years 1932 to 1937, both inclusive, the balance of each year's charge shall be payable to the United States in accordance with the contract of 1927.

Third. The amounts so expended and credited, the amounts postponed under the provisions of item 1 hereof, and any amounts of primary construction charges applicable to productive lands that shall not have become due and payable by the association under the contract of 1927, on or before December 1, 1961, shall be considered and defined as the project supplemental construction charge and shall be made payable by the association in annual installments of \$85,000, the first installment of such supplemental construction charges to be payable on December 1, 1962, and a like installment on December 1 of each subsequent year until the total of the supplemental construction-charge indebtedness is reduced to \$85,000 or less, which remaining amount shall then be made payable as the last installment on December 1 of the calendar year next following the year in which the indebtedness is so reduced; and

Fourth. No stock assessment levied by the association to raise payments due the Government on construction need be increased more than 15 per centum of the normal yearly per irrigable acre construction installment as provided in section 17 of the contract of April 8, 1927, to meet deficits or estimated deficits due to the failure of some of the association's stockholders to pay their assessments when due, any resulting delinquencies as established after foreclosure of maximum assessment liens in meeting installments of charges due the United States from the association to be paid as a part of the supplemental construction charge authorized in item (3) hereof.

SEC. 2. It shall be provided as a condition subsequent that said contract shall terminate and be annulled unless (1) the General Assembly of the State of Colorado at its twenty-eighth session enacts legislation, which becomes effective (a) authorizing a water users' association to be incorporated for a term of at least seventy-five years, and (b) amending chapter 76 of Colorado Session Laws, 1929, so as to permit the decree in proceedings to confirm a contract between such association and the United States to constitute as against parties defendant, including owners, lienors, and mortgagees of land in the district, an amendment of existing water-right contracts with individual landowners in the district, so far as the contract confirmed is inconsistent with such individual contracts; (2) the Uncompahgre Valley Water Users' Association thereupon extends its term of incorporation for at least seventy-five years from the date of such amendment of its articles; and (3) the association secures promptly a confirmatory decree, confirming such proposed contract with the United States under said amendment of chapter 76 of the Session Laws of Colorado, 1929.

A draft of contract embodying the provisions of this act was prepared and submitted to the Uncompahgre Water Users' Association March 16, 1931, but despite the very favorable terms action by the association was unduly delayed and the contract was still unsigned at the end of the fiscal year. Meantime the association urged that other concessions be granted by the Government before signing the contract, including a request for a classification of the land and the setting up of an emergency fund on which the association might draw in case of unusual accident to the irrigation works. They were advised that there was no authority in law for either action, and that the contract must be signed by August 15, 1931, or further delivery of water would be withheld, in accordance with the letter of June 18 from the Acting Secretary of the Interior to the association. In this connection it was suggested to the association that execution of the contract in the form submitted would not prevent the execution of an amendatory contract to carry out any congressional enactments that might later be secured by the association authorizing the changes desired.

CHINOOK DIVISION, MILK RIVER PROJECT, MONTANA

Negotiations have been in progress for some time to bring about the execution of contracts between the United States and the irrigation districts comprising the Chinook division of the Milk River project to provide for repayment of the adjusted construction cost of the St. Mary storage works applicable to the several divisions. There was a difference of opinion between the water users and the bureau as to the charge to be made for the construction cost of the St. Mary storage works, plus an additional amount estimated as necessary to complete these works. It was contended by the water users that the per-acre rate of \$12.25 should be the basis of their contract obligations, this amount being the adjusted cost per acre of the major works system, as found by the Board of Survey and Adjustments, up to June 30, 1925. The bureau contended that this amount should be increased to \$15 to take care of additional construction since that date.

It was finally mutually agreed to leave the determination of the per-acre rate to the court which will confirm the contracts. Shortly after the close of the fiscal year all contracts had been signed and were in court pending the confirmation hearing.

BRIDGEPORT IRRIGATION DISTRICT, NORTH PLATTE PROJECT, NEBRASKA-WYOMING

This district was organized under the State laws of Nebraska. It purchased water from Pathfinder Reservoir and then brought suit to escape payment under the contract. The case was decided in favor of the United States, with the district owing the Government \$100,000. The litigation was costly, the district needs drains, a large part of the

land is farmed by tenants, all of which resulted in the district asking for a reduction in the amount of the debt.

A conference was held in Denver on April 20, 1931, at which were present the commissioner, the chief engineer, the former superintendent of the North Platte project, the superintendent of power of the project, and five representatives of the district. It was decided that a reorganization was necessary to protect the debt due the bureau, the State bond issue, and the holders of district warrants and other obligations, and in addition provide for the construction of necessary drains. It was suggested that a committee of three be appointed, representing the State, the bureau, and the landowners to work out a reorganization plan, to be based on a classification of the land to determine what can be done to increase production, and the payments the farmers can make on existing obligations and future improvements without subjecting them to greater burdens than they should be called upon to assume.

On June 18 a conference was held at Bridgeport, Nebr., between two representatives of the bureau, the attorney general of Nebraska, representatives of the district, and a representative of the United States Attorney General.

No definite decision concerning reorganization and payments had been reached at the close of the fiscal year.

RIO GRANDE PROJECT, NEW MEXICO-TEXAS

During the fiscal year the two irrigation districts on the project again requested an extension of time to 40 years for repayment of construction charges. At a conference in December, 1930, with representatives of the project, the Secretary stated that the department could not extend the relief requested under the present contracts, but that consideration should be given by the project officials to the advisability of taking over the operation and management of the project, under which circumstances consideration would be given to any proposal for relief within the limits of the contracts.

After further conference between bureau and project representatives the following outline of a plan was formulated, conditioned upon the transfer of the project to the water users for operation and maintenance:

1. Take over operation and maintenance of project July 1, 1931.
2. Amount expended during current year (up to June 30, 1931) for operation and maintenance to be covered into construction as permitted under subsection "C" of fact finders act.
3. Total of unaccrued construction charges should be divided into equal annual installments beginning with the year 1931 and ending with the year 1962. In other words, 40 years from the date of public notice within which to pay full construction.
4. That all sums collected by each district on account of the 1930 construction charges and the 1930 operation and maintenance charges shall be promptly paid

by the districts to the United States in accordance with the terms of existing contracts. Any of such charges as may not be collected shall be extended over a period of five years with interest at the rate of 6 per centum per annum: *Provided, however,* That in no event shall the sums extended hereunder exceed one-half of the 1930 construction and one-half of the 1930 operation and maintenance charges.

5. The United States to retain as reserved works the following:

(a) Storage system.

(b) Control and allocation of the project water supply as between the several points of diversion throughout the project will be under supervision of the United States.

(c) Control of the distribution of the water supply for lands in Elephant Butte and El Paso water improvement district No. 1, having a common diversion point shall be under the supervision of the United States in so far as an equitable distribution and allocation as between the two districts of such water supply shall be concerned. Such supervision shall likewise extend to the proper maintenance and operation of the works serving such areas for the purpose of securing such equitable distribution and for the further purpose of an equitable allocation between the districts of the cost thereof.

6. The cost of maintenance and operation of the reserved works, together with the costs of any nature arising out of the exercise of the supervision named above, shall be allocated as between the districts in ratio to their respective acreages benefited thereby, and such costs shall be paid to the United States in advance on or before January 1 of each year.

7. The book value of the equipment and supplies turned over at the time the transfer is made, to be charged to the construction cost.

At the close of the fiscal year the matter was still under advisement.

BELLE FOURCHE PROJECT, SOUTH DAKOTA

The first public notice on the project fixed the building charge at \$30 per acre and covered the most productive land. It was necessary to increase the charges as additional lands were brought under construction and as these areas comprised the heavier and less productive soils, the farms in this class were confronted with an annual construction charge they were unable to meet. An adjustment contract was prepared and transmitted to the irrigation district in February, 1931, for their consideration and was approved by the qualified electors of the district the following month.

This contract provides for annual lump-sum payments beginning with \$50,000 in 1931, and increasing to \$55,000 in 1936, \$62,000 in 1941, \$69,000 in 1946, and \$75,000 in 1951, and continuing until 1955, so that the primary construction charge shall be paid within the 40-year period from the date of public notice. This schedule of payments permits the irrigation district to reduce the annual construction charges on lands that are less productive and readjust charges on other lands so as to bring about an equitable distribution of annual payments. Payment of supplemental construction charges is to be made in annual installments, each of which shall be not less than the largest annual installment of the primary charge.

The contract has been executed by the officials of the irrigation district and confirmation proceedings started, but not completed at the close of the fiscal year.

FARM UNITS OPENED TO ENTRY

Two hundred and one irrigable farm units were opened to entry during the fiscal year, as follows:

October 18, 1930, Tule Lake division, Klamath project, Oregon-California, 24.

February 9, 1931, Bully Creek west bench, Vale project, Oregon, 5.

May 1, 1931, Pilot division, Riverton project, Wyoming, 50.

June 1, 1931, part 4, Willwood division, Shoshone project, Wyoming, 35.

June 10, 1931, Greenfields division, Sun River project, Montana, 87.

These units were offered first to ex-service men, who, under the law, have a 90-day preference right of entry, subject, however, to the usual required qualification of at least two years' farming experience and available capital of at least \$2,000.

The units on the Tule Lake division of the Klamath project were filed on immediately by ex-service men who were exceptionally well qualified, more than 160 men with capital ranging from \$2,000 to \$10,000 and above, making application for the 24 available units. The eagerness to acquire these lands may be accounted for by the fact that they are located in the midst of a settled and developed community, are practically level, and require virtually no clearing.

The units on the other projects were being filed on somewhat more slowly but with every indication that within a relatively short period, after the expiration of the 90-day preference right of ex-service men, they would all be taken up.

Even on the Riverton project, whose development has been unduly delayed because of lack of adequate transportation facilities and a beet-sugar factory, hundreds of inquiries concerning the lands which lie close to the town of Riverton, had been received, and a number of prospective settlers had visited the project with a view to filing.

There is no question about the disposal of the lands on the Willwood division of the Shoshone project where the number of settlers during the year increased from 45 to 64, and on the Greenfields division of the Sun River project, as there has been a steady influx of settlers to the former during the past four years, and a marked local interest in the latter opening, where at the close of the fiscal year 34 applications from qualified applicants had been received and 30 farm units had been filed on.

Indications point to a definite trend from the city to the farm, and, with this, increased interest in the opportunities offered to

country-minded men and women of small means on the Federal irrigation projects.

In its work of settlement and development the bureau has received the whole-hearted support of the railroads traversing the projects, of local settlement organizations, and of many State agencies.

CONTRACTS

One index of the bureau's activities during the fiscal year is the nature of contracts entered into, their number, and the amounts involved, which are summarized in the following table:

Nature of contracts	Number of contracts	Amount involved
Cooperative investigations.....	7	\$15,650.00
Supplies.....	681	282,575.86
Material.....	301	1,372,072.88
Equipment.....	172	445,288.44
Miscellaneous services.....	180	129,312.61
Construction work.....	77	50,791,164.59
Land purchases, including improvements.....	48	29,727.25
Land sales, including improvements.....	2	612.00
Leases to the United States.....	28	50,721.20
Leases from the United States.....	288	74,235.50
Compromise of damages.....	12	2,985.34
Rental of Government equipment.....	28	5,725.95
Rental of water.....	286	42,687.18
Sale of surplus electrical energy.....	45	1,737,457.05
Sale of water rights to towns.....	18	50,286.80
Sale of water rights under the Warren Act.....	22	2,470,747.92
Sale of water rights within projects.....	1	8,898.84
Adjustment and relief.....	1	5,000,000.00
Transfer of project operations.....	75	49,854.55
Miscellaneous.....		
Total.....	2,262	162,560,003.96

¹ Estimated in part.

ECONOMIC AND ENGINEERING OPERATIONS

SALT RIVER PROJECT, ARIZONA

Economic.—The prevailing world-wide financial and industrial depression was reflected in greatly reduced demand and lower prices for farm products, resulting in the lowest level of prosperity among the farmers experienced since 1920–21. The accompanying slowing up of business, industrial, and construction activity was more apparent by contrast with the extensive development programs recently completed in the vicinity, including the new \$15,000,000 power generation and distribution system built by the Salt River Valley Water Users' Association, the \$5,000,000 Coolidge Dam on the near-by San Carlos project, the \$5,000,000 development in connection with the Lake Pleasant Dam, \$16,000,000 railroad construction, and building in the city of Phoenix averaging \$5,000,000 annually for the preceding four years.

The gross crop returns for the project for 1929-30 were 40 per cent less than for the year preceding, and up to June 30, 1931, there was no evidence of improvement for the current year. Farmers have had difficulty in paying their water assessments, although these were somewhat reduced by the amount of the profits from the power system.

The credit of the Water Users' Association has been maintained at a high level, and a \$3,000,000 bond issue was sold during the year on satisfactory terms, providing for the refunding of all short-term funded indebtedness and for an additional payment of \$1,800,000 to the Government on construction cost. A reduction of \$2 per acre in the current year's assessment was made possible through this funding operation. In view of this advance payment, which with previous payments brought the original construction debt of \$10,000,000 down to \$3,000,000, a new contract was approved by the Secretary of the Interior under which the balance will be spread over a 20-year period at 4 per cent interest, instead of being payable in only five yearly installments amounting to \$610,000 each.

There were no failures of banks or of commercial or industrial enterprises within the project during the year.

Bank deposits on June 30, 1931, were \$33,128,000 compared with \$35,364,000 June 30, 1930, and \$42,624,000 June 30, 1929. Building in Phoenix for the year was about on a par with the preceding year and included two modern office buildings valued at approximately \$1,000,000 each and a new theater costing \$500,000. Ground was broken at the end of the year on an additional Federal building under a congressional appropriation in excess of \$1,000,000.

The subdivision of farm lands into residence property which had in recent years affected a considerable area was practically discontinued during the year. The development of a large citrus area, mostly grapefruit, continued to increase. Few of the plantings were of a speculative nature, but consisted to a great extent of numerous 5, 10 and 20 acre tracts being developed by individuals for production. Conditions are exceptionally favorable for profitable growing of grapefruit in certain parts of the project owing to absence of disease, plant pests, and killing frost, the high quality and yield of the fruit, and the fact that it matures here at a time when the bulk of the crop may be disposed of at good prices in nearby Pacific coast markets with little competition. Suitable land for citrus orchards commands an excellent price.

Engineering.—Major construction during the year consisted of extensions to the power-transmission system involving the building of 62 miles of 110 and 44 kilovolt lines to Blackwater and Maricopa, at a cost of \$500,000, financed through a contract with the Arizona Edison Co.

The project was passing through the seventh consecutive year of unusually low run-off, broken only by a moderate wet period in 1927, at which time the total storage reached 980,000 acre-feet. In 1925 and 1929 the total stored water fell below 100,000 acre-feet and in 1930 and 1931 to approximately 150,000 acre-feet. During the last three years the 1,600,000-acre-foot Roosevelt Reservoir has for long periods been nearly dry, all stored water being held in the Horse Mesa, Mormon Flat, and Stewart Mountain Reservoirs.

These unfavorable conditions would have resulted disastrously to the project in both irrigation and power departments except for supplemental sources of water and power made available through recent development. The river and stored water was supplemented in the 12 months ending June 30, 1931, by over 330,000 acre-feet of water pumped from underground, exclusive of water pumped for drainage, which could not be utilized for irrigation. This is equivalent to $1\frac{1}{2}$ acre-feet per acre, being approximated also in the preceding year. The pumping system of the project consists of 170 wells and pumps with an aggregate rated capacity of 930 second-feet. Nearly 60,000,000-kilowatt-hour electric energy valued at \$600,000 was required to run the pumps, the power being supplied from the 115,000-horse-power hydroelectric system of the project.

For the years 1929-30, 1928-29, and 1927-28, the net earnings of the power system over operation and maintenance, interest, and all other expense were \$664,000, \$837,000, and \$1,374,000, respectively. This includes the value of power used for pumping. The power revenue represented a direct saving in assessments to the farmers for the years mentioned of \$2.74, \$3.46, and \$5.68 an acre. Without the assurance of adequate water supply provided by the pumps and the lowered assessments effected by the power revenues, it is difficult to estimate the seriousness of the situation which would have confronted the project even in a year of normal economic conditions. Without these advantages in periods of great depression such as 1930 and 1931 the results would have meant bankruptcy for a large part of the project.

The irrigation pumping incidentally provides adequate drainage and thus eliminates the necessity which would otherwise exist of pumping approximately 200,000 acre-feet annually to prevent water-logging.

The construction in 1929-30 of distribution lines to serve all project farmers with domestic power has proved successful beyond anticipation. Over 95 per cent of the estimated total possible number of consumers were connected by June 30, 1931, with the result that, instead of going through a period of operation at a loss while building load, the service of rural power came within a small sum of paying expenses the first year. This is considered a satisfactory result for the first full year of operation under adverse conditions.

YUMA PROJECT, ARIZONA-CALIFORNIA

Economic.—The Yuma project was affected by the general agricultural depression and more particularly by the failure of three of the four project banks. Immediately following the bank failures the water users of the Valley division requested some form of relief from payment of charges and on January 29, 1931, ratified a contract which was later assented to by 92.96 per cent of the landowners, representing 96.67 per cent of the irrigable acreage of the division. By this contract a year's relief from payment of charges was given. Delinquent operation and maintenance charges were funded over a period of 5 years; construction charges for 15 years; and an additional 10 years provided for completion of construction repayments. The prices forecast for cotton, alfalfa hay, and alfalfa seed—the three major crops grown on the project—were expected to return a small margin over growing costs. Some of the newer crops, such as cantaloupes and pecans, promised better returns. Low cotton prices forced a considerable reduction in cotton acreages. The advance estimates for the present season were 18,900 acres compared with 36,029 acres in 1929 and 28,073 in 1930.

There are two cooperative-marketing associations on the project. The Farmers Cooperative Association operates cotton gins and markets cottonseed. During the past year this association completed a connection with the American Cotton Cooperative Association, thus securing the advantages of standard Government gradings and more liberal advances to growers. The Yuma County Farm Bureau Marketing Association handles principally alfalfa seed and alfalfa hay. This association during the past year sold approximately 60 per cent of the alfalfa seed grown on the project. Both associations were in a sound condition at the end of the fiscal year.

Yuma Mesa.—Development of the Yuma Mesa continued slowly. Approximately 100 acres were planted to citrus trees during the year. Plantings reaching bearing age were expected to increase the total yield for this year about 50 to 75 per cent over that of 1930. Increased age of the trees was expected to improve the average quality of the fruit marketed with corresponding increase in returns. Practically all the fruit grown is marketed through the Yuma Mesa Fruit Growers Association and the Desert Fruit Exchange.

Engineering.—The annual maintenance work on Laguna Dam, consisting mainly in repairs to the talus, was being reduced as the weaker places were filled with large stone.

Studies were continued on the economic feasibility of solving the drainage problem by pumping from wells. An additional well was drilled by the Yuma County Water Users' Association. The results were similar to those found last year in pumping a well put down by the bureau, and because of high operating costs considerable doubt

still exists as to the advisability of attempting to solve the drainage problem by pumping from deep wells. Drainage will be required for a considerable area in the upper part of the Valley division affected by a high water table.

Cleaning of canals represented a large item of expense. In many localities additional right of way will have to be acquired for deposition of the spoil from cleaning, as the canal banks are mounting in height and will require leveling down before next year.

BOULDER CANYON PROJECT, HOOVER DAM

On July 3, 1930, an appropriation of \$10,660,000 was made available to begin construction of Hoover Dam, the power plant, and appurtenant works. A further appropriation of \$15,000,000 was made available on February 14, 1931. Before construction could be commenced a branch railroad was required from the main line of the Union Pacific system from a point near Las Vegas, Nev., to the dam site; also a highway, communication and power lines, headquarters buildings, and many incidental features.

During the year the site for the headquarters was selected and designated "Boulder City"; a branch railroad was built by the Union Pacific to Boulder City, and an extension to the top of the dam was 60 per cent completed by the United States; an oil-surfaced highway was nearing completion between the same points; a power line and substation were erected by the Nevada-California Power Co., and ample power was made available for all construction purposes. In addition, the plans of Boulder City were adopted, contracts made for erection of 12 houses, and advertisements issued for paving, water, and sewer systems, and all civic improvements, as well as additional buildings. A water supply will soon be available within the city, and telephone and transmission lines are installed. Within a short time all necessary work preliminary to the construction of the dam will be finished. Practically all features have been performed under contracts which have been executed in a satisfactory manner and at prices below the estimated costs.

In line with the policy to speed construction the designs for the dam and appurtenant features were advanced six months from the original plans. Advertisement for bids for construction was issued on December 15, 1930, and bids were opened on March 4, 1931. Three bids were received as follows:

Six Companies (Inc.), San Francisco, Calif.....	\$48, 890, 995
Arundel Corporation, Baltimore, Md.....	53, 893, 878
Woods Bros., Lincoln, Nebr.....	58, 653, 107

Contract was awarded to Six Companies (Inc.) in the above amount, and on April 16, 1931, this firm was given notice to proceed with the work.

Meanwhile, on March 14 the contractor established headquarters in Las Vegas, built preliminary camps, and started on the transportation systems and other work preliminary to the excavation of the tunnels.

On June 30, 1931, approximately 1,250 men were employed by this company, and buildings had been erected for office, shops, dormitories, mess houses, and 20 residences completed. Work was in progress on the railroad along the river for the removal of waste material and to the Arizona gravel pits some 8 miles above the dam site. Shovels were excavating the diversion tunnel outlets and crews had dug approximately 400 linear feet of pioneer tunnels in the top of the main bore. Much equipment was being installed and all activities were progressing vigorously.

DENVER OFFICE ACTIVITIES

Immediately after the approval by President Hoover on July 3, 1930, of the first appropriation of \$10,660,000 for the construction of Hoover Dam, the office of the chief engineer in Denver began enlarging its organization to handle the increased amount of work. The plan at that time was to have final design drawings and specifications completed ready for publication in the late spring of 1931. Contracts were immediately made for aerial and ground photographic surveys of the topography at the site of the work. Tentative designs and estimates for various types of spillways, outlet works, architectural features, mass concrete cooling systems, diversion works, and other features of the dam were started. On October 24, in accordance with the expressed desire of the President to assist in relieving unemployment conditions, it was decided to expedite the work as much as possible, and the preparation of plans, specifications, and contract drawings was rushed to completion by December 15, 1930, about six months in advance of the date originally planned. The specifications, with 76 drawings for inclusion therein, were forwarded to Washington early in December and issued on December 15. In the meantime, plans and specifications for the construction of the Boulder City-Hoover Dam highway and the United States construction railroad were completed, invitations issued, and bids opened on January 7 and 12, 1931, respectively, so that actual work was proceeding on these features while prospective bidders were considering and preparing bids for the construction of the dam and related works.

Many of the designs had been prepared in only sufficient detail for contract purposes, and during the remainder of the fiscal year designs and studies were in progress on structural details, and on the preparation of data for the information of consulting boards called to consider various features of the work. Plans and specifications were also prepared for the various works required in Boulder City, including

streets, sidewalks, water supply, sewerage, and electrical distribution systems.

Technical investigations in connection with the design of Hoover Dam were carried on throughout the year. These included the construction and testing of a model, built on a scale of 1 in 240; an experimental investigation of the nonlinear distribution of stress in the maximum cantilever section; measurements of river and reservoir water temperatures on existing projects; the installation of electrical resistance thermometers in the walls of Black Canyon, for the measurement of rock temperatures; the continuance of trial-load studies of stress magnitude and distribution in the dam; the continuance of special studies of mathematical properties involved in the stress analyses, etc.

Preliminary reports were prepared for some of the above-mentioned investigations and for some of the investigations instituted the preceding fiscal year. Studies thus far reported on include the field investigations of cracks in existing dams, temperature variations in concrete dams, temperature rise in the interior of concrete dams due to the generation of setting heat, methods of dissipating setting heat in large dams, stresses around pipes used in refrigerating concrete, flow of heat in concrete dams, and stresses in the rock surrounding diversion tunnels.

At its meeting in the Denver office early in December, 1930, the Colorado River Board reserved action on approval of the spillway designs until investigations and tests that were contemplated by the bureau were completed. Model tests of various types of spillways, each with alternative detail modifications, were in progress during the latter months of the fiscal year at the hydraulic laboratory of the Colorado Agricultural College at Fort Collins and on the South Canal on the Uncompahgre project, Colorado, these tests being carried out by personnel employed by the bureau. A memorandum covering the different types of spillways and the results of the model tests was being prepared at the end of the fiscal year for the information of the Colorado River Board at its meeting set for October, 1931.

At a joint meeting of the Hoover Dam Consulting and Concrete Research Boards in April, 1931, a comprehensive series of concrete tests and investigations were outlined and recommended for carrying out, at various locations, the major part of this work to be done at a concrete laboratory operated by the bureau at Denver. Some space was obtained for this work in the basement of the new United States customhouse and additional space in leased quarters. A 4,000,000-pound testing machine was purchased and installed early in April in the customhouse laboratory. Both laboratories were further equipped during May and June and were ready for actual tests and investigation work at the end of the fiscal year, the outline by the consulting

boards having been enlarged by engineers of the Denver office to cover considerable detail as to programs, methods and costs, this covering also the programs to be followed elsewhere than at Denver.

The membership of each of the three consulting boards which considered problems relating to the Hoover Dam during the past fiscal year is as follows:

Colorado River Board:

Maj. Gen. Wm. L. Sibert, chairman, Bolling Green, Ky.
Robert Ridgway, chief engineer, board of transportation, New York City.
Dr. Chas. P. Berkey, Columbia University, New York City.
Prof. D. W. Mead, University of Wisconsin, Madison, Wis.
Prof. W. J. Mead, University of Wisconsin, Madison, Wis.

Hoover Dam Consulting Board:

A. J. Wiley, consulting engineer, Boise, Idaho.
D. C. Henny, consulting engineer, Portland, Oreg.
L. C. Hill, consulting engineer, Los Angeles, Calif.
Prof. W. F. Durand, Stanford University, California.

Hoover Dam Concrete Research Board:

P. H. Bates, chairman, Bureau of Standards, Washington, D. C.
Prof. Wm. K. Hatt, Purdue University.
Prof. H. J. Gilkey, University of Colorado.
Prof. R. E. Davis, University of California.
F. R. McMillan, director of research, Portland Cement Association, Chicago, Ill.

The Colorado River Board met in Denver, December 1 to 6, 1930, to review the plans and specifications for the dam, power plant, and appurtenant works. Joint meetings of the Hoover Dam Consulting Board and the Concrete Research Board were held in Las Vegas, Nev., from January 12 to 15, 1931, and in Denver from January 17 to 22. At these meetings the boards studied, discussed, and made recommendations relative to the suitability of concrete materials, an outline of a program of concrete tests and investigations, and to the matter of cooling the mass concrete in the dam during the setting period. The Hoover Dam Consulting Board met in Denver March 9 to 13, 1931, to consider in detail various problems involved in the final designs. This board met again in Denver on April 20 to further consider the Hoover Dam contract and specifications. The board's report stated that it was of the opinion that the contract plans and specifications provided for the construction of a safe and efficient structure, and that it approved them for contract purposes. On April 21, 22, and 23 joint meetings of the Hoover Dam Consulting and Concrete Research Boards were held in Denver in which the details and allocation of the concrete tests and investigations were considered.

A general conference was held at Denver, Colo., during March, 1931, for the purpose of formulating plans for the final design of the Hoover power plant and to coordinate the work of the various organizations which are interested in this matter. Representatives of the

Bureau of Power and Light of the city of Los Angeles, the Metropolitan Water District of southern California, the Southern California Edison Co., the Southern Sierras Power Co., and of the major electrical machinery manufacturers were present and special consideration was given to the various problems involved in connection with the generation and transmission of the energy to be generated by the Hoover power plant.

ALL-AMERICAN CANAL

Preliminary designs and estimates and maps and profiles were prepared for the two alternative locations for the main canal through the sand hills and for the Coachella Branch Canal. The location of the lower end of the Coachella Valley canal line was revised so that it now crosses the valley north and west of the town of Coachella and extends along the westerly side of the valley, with the total length of such canal 130 miles instead of 115 miles, as heretofore contemplated. A review was also made of plans and estimates prepared by the Imperial irrigation district for the extension of the main canal a distance of 63 miles and installation of pumping plants to irrigate lands on the west mesa.

A geological examination was made of the Imperial dam site and test pits, wash and auger borings made to determine foundation conditions. Preliminary designs and estimates were prepared for a concrete and Indian type of rock-fill diversion dam with floodgates and desilting works. Estimates were also prepared for the utilization of the Laguna diversion dam.

A preliminary study was made of the irrigable area and water requirements for crops in the Imperial Valley to arrive at the canal capacities for the main and branch canals. Studies were also conducted to determine the relative power possibilities of the two alternative canal lines.

A report covering these investigations was submitted in May, 1931. A number of conferences were held at Los Angeles and Washington for the formulation of a tentative draft of contract covering the construction of the All-American Canal, repayment of the cost thereof, and the diversion of Colorado River waters for the Imperial irrigation district and its extensions, which are to include all California lands to be irrigated through that canal.

At the request of the Secretary of the Interior the State engineer undertook, with the assistance of the various interested parties an allocation of Colorado River waters accruing to California under the provisions of the Colorado River compact and the Boulder Canyon project act, which he completed as a recommendation to the Secretary after the close of the fiscal year.

Expenditures during the fiscal year were \$30,378, making the total cost of these investigations \$86,716, of which one-half was

borne by the United States, and the balance by the Imperial irrigation district and the Coachella Valley county water district, pursuant to contract of March 26, 1929.

COLORADO RIVER INVESTIGATIONS

Two conferences were held in Denver, Colo., during the year with representatives of the several interested States, with the object in view of working out a plan of carrying on the investigations contemplated under section 15 of the Boulder Canyon project act. The first conference was held August 26, 1930, with representatives of the four upper basin States, mainly for the purpose of planning the investigations in those States to assist them in securing data if they desired to use the same in their negotiations for a 4-State compact.

A second conference was held on June 9, 1930, with all six States mentioned in section 15 of the Boulder Canyon project act represented. At this conference different phases of the investigations were discussed. A resolution was passed that each of the States represented should within 30 days furnish the Government with a plan for carrying on the investigations within the State. These plans were then to be coordinated by the Government into one general plan for the investigation of the Colorado River Basin within the six States.

This plan was then to be submitted to the several States, and a conference called later for a full discussion of the same.

Field work was initiated by surveys early in June, 1931, on the upper Green River in Wyoming for an irrigation project in the vicinity of Big Piney, on the west side of the river. At the close of the fiscal year this work was getting well started, but had not advanced far enough to draw any conclusions.

Expenditures during the fiscal year were \$4,929.

ORLAND PROJECT, CALIFORNIA

Economic.—Because of lower prices for farm products, collections of charges for the year were about \$14,000 less than the accruals. At the close of 1930 unpaid charges represented 8.6 per cent of the accruals for the years in which there are delinquencies. Crop yields, on account of an ample water supply and favorable growing conditions, were above normal; returns, however, were slightly below the average for both the 10-year period ended in 1930 as well as the 20-year mean since the project's first operation in 1911.

The number of farms operated increased from 691 to 700, and the irrigated area was nearly 600 acres more than during the previous year. The number of tenant-operated farms decreased 34 and those farmed by owners or managers increased 43, indicating a salutary trend in this relation during the year's operations.

Advertising in Pacific coast metropolitan newspapers of unimproved lands under option to the bureau continued, funds for the purpose being provided by the Orland Unit Water Users' Association. More than 400 inquiries were received, 18 applications were filed, and 3 farms were sold to buyers attracted to the project by the newspaper advertising.

Project dairymen experienced the lowest prices in years for butterfat. Dairy cattle, however, increased both in number and value, indicating improvement in the herds. Butter production of Orland creameries continued at high levels, nearly 1,600,000 pounds being made during 1930. Alfalfa production exceeded any year since 1923 in tonnage, but prices were the lowest since 1916. The almond crop was the largest ever raised on the project, but returns were relatively low on account of the abundance of the crop elsewhere in California. Local cooperatives, allied with State organizations, marketed most of the project's production of turkeys, oranges, olives, and almonds.

Engineering.—Placing of concrete lining on the distribution system was continued where heavy transit losses and expensive maintenance costs had been incurred, and comprised the placing of 2,511 square yards of lining on 2,617 linear feet of laterals. Replacement during the next fiscal year of the timber head gate at the north diversion weir with a concrete structure is contemplated.

GRAND VALLEY PROJECT, COLORADO

Economic.—Confirmation of the repayment contract of January 4, 1928, was completed on June 27, 1930, and the Grand Valley Water Users' Association had paid the construction charges there specified for 1927, 1928, and 1929, but were delinquent \$10,954.64 for 1930. For operation and maintenance the association had advanced \$48,000 in 1928, \$50,000 in 1929, and \$50,000 in 1930. On June 30 only 10 per cent of the \$47,500 for 1931 was delinquent.

The Orchard Mesa irrigation district made full payment of the 1927 and 1928 construction charges, but was delinquent 7.5 per cent of the 1929 installment and all of the 1930 installment. At the close of the year negotiations were completed with the district for an adjustment contract on a 40-year basis. The district is steadily developing and with the reduced payments should make a success.

No particular difficulties occurred in furnishing water to all eligible lands, and good crops were raised on all those well farmed, but the return was much lower on account of the unusually low prices for all farm products. Alfalfa, sugar beets, beans, and grain continued to account for the major areas and values. A large number of farmers are members of the Potato Growers and Bean Growers Associations.

UNCOMPAHGRE PROJECT, COLORADO

Economic.—During the 1930 irrigation season 1,790 farms were irrigated. Of this number, 906 were farmed by owners and 888 by tenants.

The average crop value per acre was \$26.83, due largely to the low prices received for onions and potatoes. The acreage in onions was slightly below the average for the last five years. The potato acreage was remarkably low, being less than in any year during the last 16 years and only 44 per cent of the average acreage for the last 10 years.

With the exception of the transfer by purchase of a number of farms, no settlement was noticeable on the project. One farm unit was filed upon during the fiscal year. The price of farm land ranged from \$25 to \$150 per acre, depending upon the quality of the soil, improvements, and location with reference to shipping points.

The beet sugar factory at Delta, Colo., handled all beets raised on the project and also sliced the 1930 crop raised in the vicinity of the Grand Junction factory. The Colorado Potato Growers Association is the principal marketing association and handled potatoes and onions chiefly. Three cooperative poultry associations operated on the western slope of Colorado, one of which handled turkeys exclusively and the other two turkeys, other poultry, and eggs. In order to cut down overhead expenses and produce larger returns for the grower, efforts were being made to merge all three associations into one larger organization. An association for the grading and marketing of hogs was organized and was doing a good business. The cooperative oil, gasoline, and service stations located at Montrose and Delta were doing a thriving business.

The coordinating committee appointed by the Governor of Colorado in February, 1930, inspected the project during the following August and held hearings with the board of directors of the Uncompahgre Valley Water Users' Association and various water users. Their report was submitted under date of September 13, 1930, and subsequently Congress passed the act of January 31, 1931, based on the findings of the committee. A draft of contract amending the contract of April 8, 1927, and embracing the provisions of the act of January 31, 1931, was submitted to the association under date of March 16, 1931, but no action thereon had been taken by the stockholders of the association at the end of the fiscal year.

Engineering.—A considerable area of the project was seeped and the productivity of other lands impaired. The extent of the seeped area and the estimated cost of drainage had not been determined because individuals had constructed at their own expense such drainage works as were required for the protection of individual tracts, and because the question of establishing a drainage program for the project as a whole had not met with the approval of the majority vote

of the stockholders of the association. Among other things, the act of January 31, 1931, and the proposed contract provide a method whereby a drainage program may be completed during the years 1932 to 1937, inclusive, it being estimated that approximately \$500,000 would be expended for drainage during those years, the moneys so expended to be obtained from the annual construction charge payments made over a period of six years, commencing December 1, 1931. The funds so expended for drainage would then be carried in the project supplemental construction account and repaid to the United States at a later date.

BOISE PROJECT, IDAHO

Economic.—Project farmers suffered from the general depression, with prices of farm products at very low figures.

Some sales of farms were made at low prices, but the demand for farms to rent was far in excess of the supply.

Cooperative organizations were very active, with new associations being formed and the older ones expanding their facilities and marketing connections.

Water shortages to a greater or less extent in five of the last seven years have hampered systematic crop rotation programs, have prevented new seedings needing fall irrigation, and have forced the production of more wheat and other grains than would otherwise be planted.

Engineering.—The reserved works, including Arrowrock Dam and Reservoir, the diversion dam, and the power plant, were operated and maintained by Government forces. Distribution systems on the Arrowrock and Notus divisions were operated by the water users.

Drainage construction in the Wilder irrigation district, provided for in the repayment contracts, was completed. Drainage construction on the Notus division, under supplemental contract with the Black Canyon irrigation district, was completed by Government forces.

On the Payette division the Deadwood Dam was completed and available storage was held for the season of 1931. Black Canyon Dam and the power and pumping plants were operated and maintained by Government forces.

KING HILL PROJECT, IDAHO

Economic.—Of the 185 irrigated farms on the project 120 were operated by owners and 65 by tenants. About 125 acres in three farms were idle and about 150 acres of new land were being improved.

A considerable acreage of early and late potatoes had been planted and a few carloads had been sold at low prices. Grain was being harvested, with no demand. There was an increase in the acreage

of baby lima beans. The season was dry and windy and crops required a great deal of water.

The financial condition of the farmers was poor, many having had to give crop mortgages to the district in order to get water.

MINIDOKA PROJECT, IDAHO

Economic.—There were 2,270 farms actually irrigated in 1930, or 81 more than in the previous year. On the pumping division 60 per cent of the irrigated farms were operated by owners. No figures were available for the gravity division.

The demand for farm property continued to be fairly steady throughout the year and a number of sales were made. Prices varied from \$50 per acre for the less desirable lands to \$200 or more per acre for well-improved farms.

Crop yields in 1930 were good but prices for farm products were generally low. The per-acre value of the crops averaged about \$32 per acre, a reduction of about \$13 per acre below the results obtained in 1929. This was due mostly to the low prices received for potatoes and wheat, although all other farm products were affected by the general economic depression.

Owing to the unusually light snowfall over the upper Snake River drainage area last winter and to the delayed run-off in the spring because of the cold weather, Jackson Lake and American Falls Reservoirs again failed to fill. The maximum storage in American Falls Reservoir was about 91 per cent of its capacity. About 6 per cent additional of storage belonging to this reservoir was held over in Jackson Lake. About 68.5 per cent of the capacity of Jackson Lake Reservoir below elevation 6,752 was captured, and in addition some 110,000 acre-feet of normal flow water, held temporarily in the reservoir, increased the total amount impounded to nearly 65 per cent of its ultimate capacity.

There was a heavy demand among water users for all available storage and various plans were under consideration for its disposal. The Minidoka project will have somewhat less than its usual supply, but the shortage will not be serious.

Engineering.—Widening of the main south side canal was continued and enlargement of the distribution system of the pumping division was begun. A second drag line was purchased to expedite this work. A new pump, with a nominal capacity of about 185 second-feet, was installed at the first lift pumping station to replace a pump with 100 second-foot capacity that was moved to the second lift station.

The construction of the Milner-Gooding Canal was completed to Little and Big Wood Rivers and about 300 second-feet of water was being delivered into Little Wood River and near-by laterals at the

end of the year. It was planned to continue construction to the North Gooding Canal and the enlargement of this canal as rapidly as practicable.

At Jackson Lake the program of repairs, under way for the past three years, was brought well toward completion. At the end of the fiscal year about half of the fill on top of the embankment remained to be placed and half of the parapet wall to be built.

HUNTLEY PROJECT, MONTANA

Economic.—Good farms were all occupied, 609 being under cultivation. Of this number 314 were operated by owners and 295 by tenants. Prices ranged from \$75 to \$250 per acre for land in the paying class and from \$10 to \$50 for class 5 land.

The interest rate for short-time loans ranged from 7 to 10 per cent per annum and for long-time loans from 5 to 7 per cent. Banks and loan companies were very conservative in making loans of any kind, with the result that many farmers had to finance their year's operations with less cash than usual.

The principal money crops were sugar beets and beans. The acreage devoted to sugar beets was large, with conditions indicating a fair yield. The average crop condition, however, was considerably below that of a year ago, owing largely to the dry and unfavorable spring which made it difficult to get crops started and keep them growing. The water supply was adequate.

A large number of farmers are members of the Beet Growers and Bean Growers Associations. Most of the lambs and wool grown on the project were marketed through the Wool Growers Association. The Huntley Project Development Association has a large membership and was active in matters pertaining to the welfare and progress of the community.

No new industries were started on the project during the year.

Engineering.—Two and fifteen-hundredths miles of open drains were constructed during the fiscal year. Tile drain No. 10 was tapped 2 miles above its outlet and emptied into one of the newly constructed drains, with the result that this is the first year for a long time that this tile drain has not been overloaded. It is believed that this will prove a marked relief to a large area surrounding the lower part of this drain which has been more or less water-logged for years.

The very low stage of the Yellowstone River this spring, together with a snow supply in the mountains considerably below normal, resulted in efforts to increase the amount of water which can be diverted into the main canal during the period of low water in July and August. Surveys showed that the diversion could be increased materially by cleaning the main canal from the head gates to Huntley. Work was started with a yard and a half drag line on March 27 and

2.16 miles of canal were cleaned. Work was completed on May 5, 25,000 cubic yards of material being removed at a cost of 25.2 cents per cubic yards. The work was difficult in places because of the location of the canal between the railroad tracks on one side and steep hill-sides on the other, making it necessary to handle the material taken from the canal several times before it could be finally disposed of. This work was quite effective in increasing the quantity of water that could be diverted into the main canal, and it is believed that additional maintenance work will not be required for a considerable number of years.

Surveys were made in the fall of 1930 for seven proposed additional drains.

MILK RIVER PROJECT, MONTANA

Economic.—The 1930 irrigation season was particularly advantageous to crops grown on the 451 irrigated farms, and the farmed area was considerably greater than in preceding years. Although the average price received for farm produce was below normal, the gross crop revenue was only slightly below that of 1929 and above the 10-year average. There was a substantial increase in the acreage of sugar beets and an excellent crop was harvested, the average yield being 12.28 tons per acre. Practically all beet growers realized a substantial profit for the season, which resulted in a material increase in the area planted in 1931.

Owing to subnormal rainfall the dry-land crop was almost a complete failure and the principal farm revenue of the locality was from the project area.

During the fall of 1930 an aggressive colonization campaign was conducted by the several agencies active in project development. Attractive sale contracts were offered by the holders of excess lands and as a result 24 new settlers, principally from the adjacent dry-farming areas, were located on project farms. Most of these new settlers acquired farms which have not been cultivated for many years, as a result of which there promises to be a substantial increase in 1931 in the irrigated area of the project.

A great improvement in irrigation methods and farm practices was evident during the season of 1930, due principally to the efforts of the associate extension agent who has been located on the project for the past two years. The old method of flood irrigation which had been in common use during the past was giving way to more modern practice with beneficial results to project agriculture.

The industrial situation remained practically the same as in past years. The excellent results from the 1930 beet crop stimulated the sugar industry, and although a considerable reduction in the guaranteed price for the 1931 crop was necessary, about 5,000 acres were

contracted for this season, representing an increase of about 50 per cent.

Owing to the generally depressed economic condition of the locality resulting from two years' failure of dry-farm crops, credit of any nature was difficult to obtain, especially for the purchase and development of irrigated farms. Had there been some source of financial assistance available for development purposes during the fall of 1930, at least 50 new settlers could have been established on the project. Many very capable dry-land farmers desired to move onto irrigated farms but could not do so for lack of capital to carry on the first year's operations. If such credit were available, rapid progress could be made in the colonization and development of the project.

Engineering.—The major portion of slide removal and bank strengthening was completed and the St. Mary Canal, through those sections affected by slides, was in condition to carry approximately its maximum designed capacity. About 40 per cent of the timber substructure of Spider Coulee flume was replaced, and the balance will be renewed during the fiscal year 1932. It is now possible to safely divert about 80 per cent of the designed capacity of the canal, and the bank reconstruction of the past three years has reduced seepage losses through the first 5 miles to approximately 11 per cent. The work to be done during the fiscal year 1932 should restore the canal to its maximum designed capacity.

Two timber checks and three timber turnouts were constructed to deliver water to lands previously unsupplied. Twenty-three deteriorated timber turnouts and checks were replaced with like structures of concrete.

SUN RIVER PROJECT, MONTANA

Economic.—The alfalfa acreage on the project is steadily increasing, much of the crop being fed on the farm. During the fiscal year 30 cars of lambs and 353 head of cattle were fed, and although market conditions were unfavorable and there was little profit in the work it showed what could be done and probably will result in a considerable development of this industry which it is believed can be made the backbone of the project.

Progress was made in hog raising and a number of purebred Duroc Jersey pigs were purchased. This year there are probably more hogs on alfalfa pasture on the Greenfields division of the project than ever before and they are doing very well.

Seed peas, for which there is only a limited market, were raised quite successfully during the season of 1930 and were planted again this year. This is a new industry on the project and it is believed that it will continue to be popular. In 1930 the great northern navy

bean crop was quite successful, and in 1931 a considerable acreage was planted again to beans. Only a start has been made in growing beans and peas, but it has been effectively demonstrated that these crops can be grown successfully and at a good profit.

Probably the best indication of agricultural progress is the acreage planted to potatoes and the quality of the seed used. In 1931 about 150 acres were planted with certified seed and the stands from these plantings were excellent, showing a marked contrast to the fields planted with ordinary seed. If the potato crop develops as is confidently expected there will be potatoes to supply the project needs and a good surplus to market. Great Falls, the nearest large city, ships in every year large quantities of potatoes from Idaho and Colorado, and a local marketing organization has been formed for marketing the project potato crop.

Shelter belt and farm plantings of trees were made on 42 project farms, the trees being obtained from the Federal Government nursery at Missoula. As the project lands are entirely treeless in their natural state, these plantings will add greatly to the appearance of the farms as well as to comfort in the farm homes. In the past there have been a number of farms on which shelter belts have been successfully started and already these have made a very creditable showing.

Eighty-seven farm units were offered for homestead entry on June 10, ex-service men only, as usual, being permitted to apply therefor for the first 90 days. By June 30 there had been received 34 applications. Nearly all applicants appeared well qualified. The work of allocating the farms was still in progress at the end of the year, with every indication of further applications being received.

There is an additional area of about 20,000 acres in the Greenfields division and 7,900 acres in the Mill Coulee division that can be brought under irrigation by the construction of the necessary lateral system. Much of this land is withdrawn from entry and indications are that there would be a brisk demand for these farms if the irrigation system were completed and the lands opened to entry.

Engineering.—The Fort Shaw irrigation district continued to operate the Fort Shaw division very successfully.

For the North Side divisions, comprising Greenfields, Big Coulee, Mill Coulee, and Sun River slope divisions, important work was completed in finishing the enlargement of the main canal and Pishkun Reservoir. The main canal was enlarged by Government forces with two electric drag lines. The canal was of about 500 second-foot capacity and was enlarged to a capacity varying from 1,300 second-feet at the outlet of Pishkun Reservoir to 1,000 second-feet at Fairfield, where the irrigable lands are located. This work was estimated to cost \$251,234, but actually cost only about \$130,000, and was finished well within the estimated time. The cost of the two drag lines

was entirely charged into the work. The Spring Valley Canal, comprising about 15 miles of new canal of 1,136 cubic feet per second capacity, was completed during the year. The cost of this canal was about \$203,000 compared with an estimated cost of \$267,651.

The enlargement of Pishkun Reservoir, by the construction of two earth dikes and excavating a connecting channel, was finished early in 1931 and the reservoir was filled to capacity in June. The dikes were constructed under contract and the connecting channel was excavated by drag line operated by Government forces. The estimated cost of this work was \$250,000 and the actual cost about \$119,000.

During the fiscal year the lateral system of the Greenfields division was extended to deliver water to 87 unentered farm units within the area heretofore considered irrigable and also to take in about 5,000 acres of land owned by settlers who have been waiting a good many years for irrigation water. This work was practically completed on June 30.

The future immediate needs of the project consist of priming and puddling the main canal in order to reduce leakage. This work will be done during the summer of 1931. It was also proposed to investigate seepage conditions which appeared to be aggravated by the recent increased use of irrigation water. Necessary drains should be constructed to relieve seepage conditions and protect the investment of the United States.

LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA

Economic.—There were 490 cultivated farms, irrigated and dry-farmed, on the project. Of these 406 were irrigated or at least partly irrigated. The area under irrigation was 28,681 acres and the dry-farmed area of land that could have been irrigated was 6,936 acres. In addition to these, 77 farms, comprising an area of about 2,800 acres, were not farmed at all, largely because they did not have buildings to house the farm workers. Farm owners cultivated 232 farms, and tenants 258. During the current year 47 per cent of the farms were cultivated by owners compared with 46 per cent the previous year.

Settlement work was continued, the Lower Yellowstone Development Association maintaining a colonization agent in northern Colorado during the summer season with satisfactory results. During the last three years about 40 families have been moved to the project through the efforts of the association.

The Holly Sugar Corporation continued the operation of the factory at Sidney. A flour mill was operated at Sidney throughout the year, and one at Fairview intermittently. A modern creamery specializing in the manufacture of butter and ice cream was operated

continuously by the Armour Co. at Sidney. A seed cleaning and distributing plant was in continuous operation at Sidney. The Hardesty Co. erected a branch factory at Sidney for the manufacture of metal culverts, flumes, and other irrigation and drainage accessories.

The Farmers' Union continued to be an important factor in the marketing of grain and livestock. Some material, such as lumber, twine, etc., was purchased through the union. A wholesale and retail oil and gasoline station was operated by the union at Sidney.

The financial record of the irrigation districts was satisfactory. At the close of the year the Montana district, which comprises about two-thirds of the project area, had met its contract obligations in full, both for construction and for operation and maintenance. The North Dakota district owed \$3,767.69 on construction, but had advanced \$4,629.98 for operation and maintenance above the amount due. All operation and maintenance was financed by funds advanced by the districts. The districts are using the revolving tax-redemption fund to acquire tax titles to some of the delinquent lands and are placing settlers on them who will cultivate them and pay the charges, but this process is, at best, rather slow.

One of the most urgent needs of the project is to find some means of getting a larger percentage of the lands on a paying status. The Federal Land Bank will make loans in Montana but not in North Dakota. The bank, however, will not loan on unimproved land, and consequently is of little assistance to those who most need it. Local money can be had on good security for short periods at 10 per cent interest, but this does not help in developing the run-down farms.

Engineering.—About one-fourth mile of the main canal bank was strengthened by bank drainage and flattening the outside slope. The program of silt removal from both the main canal and lateral system was continued. Construction of the drainage system was completed, about 12 miles of drain being built during the year. Results of drainage were highly satisfactory.

NORTH PLATTE PROJECT, NEBRASKA-WYOMING

Economic.—The water supply was sufficient for all irrigation requirements in 1930, but the storage carry-over in Pathfinder Reservoir was depleted to one-third the capacity of the reservoir. The winter of 1930-31 was exceedingly dry and only 325,000 acre-feet were added to storage for the 1931 season. This is the lowest storable run-off of record for the North Platte River.

Crops for 1930 were generally good but prices were low, except for sugar beets, for which the price was the same as for the previous year. Sugar beets comprised 60 per cent of the total project crop return and were valued at \$4,024,000. For the 1931 season the price to be paid the farmers was reduced from \$7 to \$5 per ton, and this reduction,

combined with late planting and poor stand, will reduce the 1931 yield and gross return.

Cooperative cheese factories and the North Platte Valley Poultry Marketing Association continued operations in 1930, their sales being slightly less than for the previous year. Turkeys valued at \$124,988 were sold by farmers through the association. The total output of cheese was 1,200,000 pounds.

Sheep and cattle feeding was carried out on a reduced scale, the number of sheep fed being only two-thirds as great as for the previous year. The hay market declined after January 1, 1931, and hay was sold at \$4 to \$5 per ton.

Engineering.—No construction work was in progress. The reserved works, comprising Pathfinder Reservoir, Guernsey Reservoir, Whalen diversion dam, and the power system, were operated and maintained by the United States. The project canals and distribution systems were operated by the four irrigation districts. The amount of electric power distributed to consumers was 24,408,568 kilowatt-hours and the gross income from the sale of power was \$264,320.56. The income from the sale of power was slightly less than for the previous year owing to restricted mining operations by the Colorado Fuel & Iron Co., at Sunrise, Wyo., and to shortage of water supply for power generation at Guernsey during the winter of 1930–31. During the winter of 1930–31 considerable progress was made in rural extension of power lines on the project, but the recent economic situation halted this work.

NEWLANDS PROJECT, NEVADA

Economic.—The irrigated area totaled 52,562 acres, of which 7,654 acres, mostly in the Carson Lake community pasture, were outside pasture lands. Farms operated by owners numbered 530 and by tenants 153. Ten new water-right applications were approved for a total of 420.5 acres.

As a continuation of rural electrical development, Local Improvement District No. 12, embracing the West Side Old River district, was formed, being confirmed on April 14, 1931. Six per cent bonds for a total amount of \$6,500 were sold at par plus accrued interest to the local bank and farmers, in addition to which \$352.50 was received in cash, to provide funds for electrical construction work to serve 20 new consumers in that improvement district. From 1927 to the end of the fiscal year bonds totaling \$158,900 had been sold on the same basis, largely to local interests, for installation of electrical lines and equipment in nine local improvement districts. Cash payments by water users for the same purpose amounted to \$5,473.

In spite of low prices for farm products and depressed conditions, operation and maintenance, taxes, and other charges were met by

water users with very few delinquencies, although with real sacrifice in many instances. All project payments due the United States were met promptly by the irrigation district.

Several loans on project farms were approved and made by the Federal Land Bank of Berkeley. Federal farm loans at the end of the period totaled 94, with only two delinquencies in meeting payments. This was considered by bank officials to be a remarkable showing.

In spite of low prices for butterfat, dairying continued as a major industry, the size and number of herds being maintained remarkably well. Butterfat was marketed largely through the Mutual Creamery Co., which operated a local creamery, and by shipments to the California Milk Producers Association, of which many of the local dairymen are members.

Alfalfa and wheat continued to dominate the cropped acreage, other main crops being corn, barley, potatoes, and melons. The raising of cantaloupes for seed during 1931 indicated the commencement of a new industry, local climatic, soil, and other conditions being considered exceedingly favorable.

The poultry industry continued to be of major importance, although low egg prices prevailed during most of the period. The number of poultry, exclusive of turkeys, reported in December, 1930, was 89,150, an increase of 7,770 over the previous year.

On October 22 the Nevada Turkey Growers Association, of which the largest interests were on the Newlands project, voted to affiliate with the Northwest Turkey Growers Association in order to receive the financial and moral support of the Federal Farm Board. Under the auspices of the new organization bids were called for, and most of the turkeys, including many birds from the Yerington and Lovelock Valleys, were pooled for marketing. Three pools were formed for shipments during November, December, and January, such shipments being largely to southern California and San Francisco markets. One shipment of 39,000 pounds went to Jersey City, N. J. Total pooled shipments amounted to approximately 404,967 pounds. Numerous turkeys were also marketed locally and by individuals outside of the pools at similar prices. Local turkeys brought top prices wherever sold.

Engineering.—During the 1930 irrigation season no pumping was necessary to supplement Lahontan Reservoir supply, but pumping from Lake Tahoe by Truckee Meadows interests was in progress during and after August.

As Lahontan storage was insufficient for requirements during the 1931 season, reconstruction and operation of the Stillwater pumping plant were necessary to deliver drainage water into the S 2 Canal from Stillwater Slough. The AA Canal pumping equipment was moved to Lahontan where a plant was installed and water pumped from Carson

River at the Rock Dam ditch and Ky lateral, both formerly served from the Truckee Canal. This layout also involved the construction of 300 linear feet of No. 84 metal flume across the Carson River and reconstruction of about 1 mile of the old Rock Dam ditch.

To further augment the water supply a new earth dam was placed across Old River, and a ditch 2,695 feet long was constructed to divert water from the river into the S Canal. A new ditch 935 feet in length was also constructed to divert the Carson Lake drain flow into the AA Canal.

Fernley stock water pipe lines were extended 759 feet, using 3-inch diameter wood-stave pipe.

Construction of new drains by the district amounted to 6.43 miles.

Improvements in the Carson Lake community pasture consisted of 4,200 linear feet of ditch, 2,500 linear feet of irrigation levee, and 2.5 miles of partition fence.

The rural electrical distribution system was extended by the construction of 9 miles of single-phase lines in Local Improvement District No. 12. Two and one-half miles of similar line were constructed by the district to serve the east side Old River area. Operation of the old privately constructed Douglass-Renfro power line, 6 miles in length, was assumed by the district. Three miles of single-phase power line and 3 miles of secondary lines were constructed to serve the town of Wadsworth by extension of the Fernley system. By arrangement with the United States Department of Commerce, 3 miles of single-phase power line, serving the Fernley Airway landing field, were converted to 3-phase. At the end of the fiscal year 514 consumers were being served from power lines operated by the district, an increase of 65 during the year.

A new plant erected by a salt company, 24 miles east of Fallon on the Lincoln Highway, was producing and marketing salt for various uses from natural and extensive salt beds in that vicinity. This salt, occurring almost pure in its natural form, requires little refining.

During the year the new Fallon City Hall, a substantial building constructed of concrete, brick, and tile at a cost of approximately \$80,000, was completed and occupied. The concrete paving of six blocks of streets in the business section of Fallon was completed during November, 1930.

CARLSBAD PROJECT, NEW MEXICO

Economic.—There were 429 farms cultivated during the year, of which 118 were cultivated by tenants and 311 by owners or their managers. Practically the entire irrigable acreage was utilized. A few farms were sold during the year to local people. Prices of farm lands ranged from \$150 to \$300 per acre. Crop yields for 1930 averaged \$54.33 per acre, or \$21.94 per acre less than in 1929. The

financial condition of the project was fair. Bank deposits at the close of the year were \$575,000.

Engineering.—The greatest need of the Carlsbad project is, and has been for some time, additional storage facilities. Considerable study was made both by project forces and by Consulting Engineer L. C. Hill, employed by the Pecos Water Users' Association in connection with increasing the capacity of Avalon Reservoir by raising the dam not to exceed 10 feet, concreting most of the main canal, and building a reservoir near Fort Sumner at what is known as the Alamogordo site. A preliminary report was presented to the Pecos Water Users' Association by Mr. Hill which discussed the probable result of raising Avalon dam 8 or 10 feet and the amount of water that could be conserved by lining the main canal. Further report on the Alamogordo site will be made by Mr. Hill to the Pecos Water Users' Association. The possibility of additional storage at Lake McMillan, by continuing the dike to cut off water from present banks on the east side, should be given close study.

RIO GRANDE PROJECT, NEW MEXICO-TEXAS

Economic.—Practically all of the project is in private ownership and is approximately 95 per cent under cultivation. Of the 4,800 farms, 3,179, or 66 per cent, were operated in 1930 by owners and 1,621 by tenants. Only a few large tracts were being developed in areas of several hundred acres, and although several farms exceeded 160 acres, the typical farm was probably from 60 to 120 acres. Some large tracts were being sold in smaller farms and some farms near the city were being subdivided for homes.

There is a wide opportunity and urgent need for improvement and development in the livestock industry and diversified farming.

The only new industry established on the project during the last year pertaining directly to farming was the installation of the first alfalfa meal mill at Clint, Tex. There are 38 cotton gins on the project, with 6 more in the Hudspeth District below the project, 5 cotton compresses, 6 cottonseed-oil mills, and 1 cotton-textile mill. El Paso's commercial and industrial activities and development directly or indirectly broaden the opportunities of a local market for farm produce. The city offers a market for a considerable amount of whole milk produced on the dairy farms of the project. One concern has three milk cooling plants in the valley, outside of El Paso, besides the large plants in the city. In El Paso there are a number of cold-storage wholesaling and commission produce establishments serving El Paso trade territory. Power transmission and distribution lines from a large modern steam generating plant located at El Paso reach almost all parts of the project.

Cooperative producing, buying, and selling associations include the Southwest Irrigated Cotton Growers Association, Elephant Butte Alfalfa Growers Association, Mesilla Valley Fruit Association, El Paso Valley Bartlett Pear Association, El Paso Egg Producers Association, Elephant Butte Chili Growers Association, and Elephant Butte Dairy League. The Southwest Irrigated Cotton Growers Association is a strong organization with large membership and provides crop financing through intermediate credit banks as well as cooperative marketing. The Alfalfa Growers Association during the past year installed the first alfalfa meal mill on the project and shipped a considerable amount of alfalfa meal. The cantaloupe crop is handled entirely through eastern distributing concerns. The distributors contract the acreage in advance and limit this to what they have learned from past experience they can handle. The crop comes in between the Salt River Valley and Colorado crops and is handled by the same packers and shippers progressing from one locality to the other as the crops come on. The Elephant Butte Chili Growers Association operates a valley dehydrating plant. The Elephant Butte Dairy League is a new organization of dairy farmers formed for the purpose of operating a cooperative milk distributing plant in El Paso.

Some of the cotton processing plants are still farmer-owned and operate on a profit-sharing basis, but recent economic conditions caused many of the cooperative plants to be turned over to a large corporation, which operates locally as well as throughout the south and southwest. The Dona Ana County Farm Bureau, with several "locals," functions in the New Mexico division of the project, and the El Paso County Farm Bureau, with its "locals," functions in the Texas division. The New Mexico Agricultural College and Experiment Station are located near Las Cruces and render a great deal of assistance to project farmers in carrying on investigations and giving advice. Electricity and telephone service are available to practically all parts of the project, giving greater conveniences to rural life. Social intercourse is broadened by the farm bureau meetings, rural clubs, churches, and community centers.

As a result of the economic depression new improvements, both farm and public, decreased. Crop financing was more difficult to obtain and there was probably some increase in mortgages where they could be negotiated. Notwithstanding the general depression in economic conditions, delinquencies in payment of project charges to the Government were of relatively minor amounts.

Engineering.—During the fiscal year work progressed on the extension or improvement of the drainage system, 9.65 miles of drains being built in the Elephant Butte irrigation district. This will provide drainage for about 700 additional acres of project lands besides furnishing better protection to adjacent lands. In the El Paso dis-

trict 6.9 miles of drains were built in connection with the Riverside Canal construction, with funds advanced by the district. This work will reclaim and protect about 800 acres additional. El Paso County also constructed about 14 miles of drains in connection with their levee construction which will furnish some drainage to about 1,000 acres besides providing flood protection to large areas of project lands.

There were 3.07 miles of the lower end of the Riverside Canal completed during the fiscal year. A gap of about 2 miles remained to be completed, which was indefinitely delayed, pending river straightening.

The most urgent work remaining was the extension or improvement of drainage facilities for the remainder of the irrigable area, or for about 6,000 acres scattered throughout the project. This will require extensions to some drains and a number of short branch drains.

Financing of the drainage construction in progress in the Elephant Butte irrigation district was brought about through a contract dated December 20, 1929, by increasing the district's construction liability by \$450,000, of which \$260,000 is to apply as credits for land taken for drainage rights of way. Additional drainage construction in the El Paso County Water Improvement District No. 1 is urgently needed, but is contingent upon further financial arrangements. Through the lower district of the project river rectification and flood protection are considered essential, but these must be left to other agencies than the bureau.

UMATILLA PROJECT, OREGON

Economic.—East division: Owing to the reclassification and cancellation of certain lands on the east division there remain only 10,940 acres of irrigable land to which the distribution system is prepared to deliver water. At the close of the fiscal year 7,462 acres had paid operation and maintenance charges and 7,214 acres were actually being irrigated. There was a slight decrease of dairy stock on the project during the past year, but a marked increase in chickens, especially in the commercial flocks, where better than a 50 per cent increase was noted. Figures from the Farm Bureau Cooperative Association as of July 1, 1931, showed that feed was being furnished to the producers at a price which made it possible for them to place eggs in the crate at a net cost of 6 cents per dozen. Approximately the same number of turkeys will be marketed from the project as were shipped out last year and owing to the low price of grain the growers will have a profitable year.

West division: The loss in irrigated acreage caused by the abandonment of several farms in the Boardman district on account of waterlogged conditions was partially offset by the preparation of a few tracts of land for irrigation for the 1931 season.

Lateness of the watermelon crop resulted in practically a total financial loss to the growers, and a much reduced acreage of this crop was foreseen for 1931.

Several changes in ownership and among renters took place during the year, all changes being due to trades excepting two sales of small acreage. The Federal Land Bank foreclosed on three farms during the year.

VALE PROJECT, OREGON

Economic.—In the Harper and Little Valley units, for which water was first made available in the spring of 1930, considerable improvement and progress were made. Some new homes were built to replace those of a temporary construction. Both shade and fruit trees were planted, including one apple orchard of 400 trees. The lands were plowed and leveled in preparation for the sowing of more permanent crops, such as alfalfa and clover. More dairy stock and poultry were in evidence, and, as a whole, the unit had developed as well as could be expected under the general depression and the low price of farm products.

Public Order No. 2 was issued by the Secretary on January 6, 1931, opening public lands to entry and announcing the availability of water for private lands in Bully Creek West Bench division, comprising a total irrigable area of about 4,000 acres. Of the five public land farm units opened to entry, three had been filed upon and allowed and two were pending action by the examining board. Of the private lands available for sale only a few tracts remained unsold. Applications were made on this unit by 19 water users. Clearing and cultivation of lands were well under way and the grain crops being grown on several tracts compared favorably with those on older lands adjacent to the project. On some of the tracts alfalfa and clover were sown with the grain crops and for new seeding were making rapid growth.

Some activity in building and in clearing and preparing the land in anticipation of obtaining water in the spring of 1932 was also apparent on the Bully Creek East Bench unit by owners who had purchased land on this unit prior to the availability of water.

The Vale-Owyhee Land Settlement Association continued active throughout the year in obtaining settlers for the project. No co-operative associations had been established on the project, but various associations operating in adjoining communities will no doubt expand to include this territory when conditions justify.

The Vale project is fortunate in having two good highways traversing its entire length. Market roads were being constructed by the State and county through the project lands to connect with these highways.

Engineering.—Installation of stop-plank crest and operating machinery on Warm Springs Dam was completed, increasing the

storage capacity of Warm Springs Reservoir from 170,000 to 190,000 acre-feet. Bully Creek and Fairman Coulee plate-steel siphons, 101 inches in diameter and 7,425 feet in length, including concrete transitions, were constructed and 1,300 linear feet of concrete lining placed in the canal between siphons; 11 miles of main canal were excavated, completing the Vale main canal and canal structures to mile 43.5. The lateral system for Bully Creek West Bench was completed; excavation of laterals on Bully Creek East Bench was 85 per cent complete and construction of appurtenant structures 12 per cent complete.

To furnish an adequate water supply for the lands of the project it will be necessary to construct the proposed storage dam and reservoir on the North Fork of Malheur River.

To complete construction of the project, including the additional storage, appropriations of approximately \$1,100,000 will be required in addition to those made available to and including the fiscal year 1932.

KLAMATH PROJECT, OREGON-CALIFORNIA

Economic.—The main division of the project contains 523 farms, 470 of which were farmed. Of the farms irrigated, 345 were cultivated by owners and 125 by tenants. In the Tule Lake division there were 240 farms, of which 206 were operated by owners and 30 by tenants; 4 were idle. No difficulty was experienced in getting settlers for lands in the Tule Lake division. For the 24 farm units containing 1,624 acres of irrigable land, opened under Public Order No. 26, September 10, 1930, there were 162 qualified applicants, a number of whom showed assets in excess of \$10,000 each. The Langell Valley, Horsefly, and Shasta View districts had little or no success in obtaining purchasers for the uncultivated lands within their boundaries.

The 1930 crop yields were average or better, but net returns were unsatisfactory as prices for all farm commodities were the lowest in years. Owing to exceptionally poor range conditions project pastures were carrying an unusually large number of livestock. A fair price for hay for the fall of 1931 was anticipated.

During the year the Malin Cheese & Produce Association, the Langell Valley Cheese Factory, and the Klamath County Dairymen's Association combined under one general manager in order to pool their products for marketing purposes. Other cooperative organizations operating during the year were a hay growers' association, potato growers' association, and a poultry producers' association. The last named concern did a business in 1930 of \$57,930. The total amount of business done by the three other concerns amounted to \$266,000.

Engineering.—Work during the year included the construction of Clear Lake Channel, Dry Lake pumping plant No. 2, permanent im-

provements at Tule Lake station, completion of the enlargement of the Lost River diversion channel, continuing work on the enlargement and extension of the drainage system on the main division and on the extension of the lateral and drainage systems on the Tule Lake division. The work required the construction of 5.5 miles of channel in Clear Lake Reservoir, enlargement of 5 miles of the Lost River diversion channel, construction of 11 miles of laterals, 20 miles of drains, reconstruction of 18 miles of drains, and installation of 3 major and 300 minor structures. Work on the enlargement and extension of the main division drainage system will be continued during 1932. In the Tule Lake division only sufficient work will be performed to permit the opening of lands upon which works have been practically completed.

OWYHEE PROJECT, OREGON-IDAHO

Engineering.—The excavation and stripping of the fault zone and foundations of Owyhee Dam were followed by placing concrete, 315,000 cubic yards being poured between July, 1930, and June 30, 1931. This brought the top of the highest panels in the dam to the galleries at elevation 2,500. An entrance tunnel to the lower galleries at elevation 2,378 was excavated and the portal built. Lining of the spillway shaft was carried up to the spillway-crest structure and installation of the ring gate controls begun. This contract was 72 per cent finished and the time 64 per cent elapsed at the end of the fiscal year.

Progress on the Owyhee tunnels was as follows:

Tunnel No. 1, inlet end, T. E. Connolly contract; excavation 5,124 feet in; contract 39 per cent completed with time 34 per cent elapsed.

Tunnel No. 1, outlet end, J. F. Shea Co. contract; excavation 5,221 feet in.

Tunnel No. 5, inlet end, J. F. Shea Co. contract; excavation 10,420 feet in.

Shea's contract was 49 per cent completed with time 34 per cent elapsed. The J. F. Shea Co. established two world's records in driving tunnels by completing 1,315 linear feet in a 31-day period in April and May, 1931, with a maximum of 63 feet in one day.

Tunnel No. 5, outlet end, S. S. Mogoffin contract; excavation 4,415 feet in; contract 31 per cent completed with time 33 per cent elapsed.

It was planned to start construction of the North Canal, Mitchell Butte division, between Tunnel Canyon and the Owyhee River, as soon as funds were made available and contracts let.

In addition to appropriations of \$11,000,000 already made, further appropriations of \$7,000,000 will be required to complete the project.

BELLE FOURCHE PROJECT, SOUTH DAKOTA

Economic.—Settlement and farm occupancy remained about the same as for the previous year, with tenantry furnishing a good demand for the places with suitable buildings and ownership stationary at about 25 per cent of the total project farms. A noticeable scarcity of new capital for farm development was in evidence and newcomers from the dry-land regions of this section were without means for undertaking anything but tenancy in its simplest form. Eighty-nine per cent of the farms were in operation but only 50 per cent had residents, indicating a spread over too much irrigable land and the need of more intensive cultivation.

The sugar-beet industry was slightly curtailed in acreage largely because of the realization that only well-prepared ground will produce profitably. Returns from this crop in 1930 were valued at \$631,000, or \$89 per acre, and the price of \$7 per ton was a material factor in creating confidence and dependence on this industry as a way out of financial difficulties. For 1931, however, the price dropped to \$5.50 per ton and, although labor was cheaper, the general outlook occasioned by low market prices of products was discouraging. The low water supply resulting from two years of drought created further uncertainty concerning maturity of the long season crops and lack of water and feed on the range disturbed the plans of project sheepmen.

A change in irrigation district contract repayment terms effective with the year 1931, whereby the low-producing lands received a reduction in rates, proved very helpful in adjusting a long-standing complaint on the part of the owners of heavy soil. Eighty-three per cent of the farms were eligible for water service on June 30 notwithstanding a heavy acquisition of tax deeds by the county, amounting to about 60 farms. Payments by the district due the United States were met in full on both construction and operation accounts.

Engineering.—Construction of open drains continued. Other minor engineering work consisted of repairs to the south canal bank and lining mile 11.3 and also repainting of Indian Creek and Horse Creek siphons.

Contract construction of open drains added 52.4 miles to the system. Minor drainage work by Government forces consisted of 5.2 miles of open and 1.08 miles of closed drain, making a grand total of 163.6 miles of open and 1.98 of closed drains.

Under the existing contract about 35 miles additional will be constructed during the first half of the fiscal year 1932 and the system will then be complete except for minor extensions and additions needed to reclaim isolated areas.

Repairs to the south canal bank and lining mile 11.3 began in September, 1930, and were completed in April, 1931. A new 4-inch

concrete lining on the sides was placed as a covering over old concrete for a distance of 1,287 linear feet. Reconstruction of the embankment at this point involved 4,500 cubic yards of fill and 550 linear feet of tile drain.

The Indian Creek and Horse Creek steel siphons were repainted during the fiscal year. This required scraping and sand-blast cleaning of about 7,000 square yards of plate metal and application of a priming coat of water-gas tar and a finish coat of coal tar.

SALT LAKE BASIN PROJECT, UTAH

Economic.—In the summer of 1930, during the later stages of construction of the Echo Dam, 12,000 acre-feet of water were stored in the reservoir. Although this amount of water was small, it proved to be very valuable in maturing fruits, vegetables, and other crops on the project lands under the Weber River.

The lands of the division have been farmed and partially irrigated for many years. They are all in private ownership and occupied mostly by the owners. The holdings on about 60 per cent of the area, in the general vicinity of Ogden and Layton on the Weber River side and on Provo Bench on the Provo River side, average less than 30 acres and consist of highly developed land used largely for the growing of fruits, berries, vegetables, sugar beets, and alfalfa. The remainder of the holdings contains from 30 to 80 acres each where hay, grain, and sugar beets are the most important crops and where dairying, stock, and sheep raising are important industries. Most of the farmers live on their farms.

Few industries were added during the past year, but the division was already well supplied by a large number of fruit and vegetable canning factories, several fruit packing plants, three sugar factories, three or four creameries, and one meat packing and by-products plant.

The Wasatch Gas Co., in conducting an expensive program in bringing natural gas from a western Wyoming oil field to Utah, was extending gas lines to many of the small towns of the division as well as to the cities. The project was also well supplied with electricity which had been made available to the rural districts.

A large number of associations have been organized both recently and in the past for the cooperative production and sale of canning and packing crops, sugar beets, dairy and poultry products, sheep, and cattle. The associations as a rule were very active and aided materially in improving the quality of the agricultural products and finding markets for them.

The general economic condition of the farming districts was very good, although they were affected somewhat by the general depression. Practically no farms were abandoned in 1930, and mortgage foreclosures were quite unusual. The population of the rural districts

is staple, as is indicated by the constant increase in the construction of modern farm homes. The value of farm crops in 1930 varied from \$15 per acre on hay and grain lands where the water supply was deficient to as high as \$200 per acre on fairly well-irrigated fruit lands. The average crop value was estimated at \$35 per acre for 75 per cent of the division and \$100 per acre for the remainder. With a dependable late season water supply from the full use of the Echo Reservoir, there will be a decided increase in the higher-priced crops.

Engineering.—The first unit, or Weber River division, of the Salt Lake Basin project comprises the construction of the Echo Dam and the Weber-Provo diversion canal at an estimated cost of \$3,000,000. The total amount expended to the end of the fiscal year was \$2,793,929.28, of which \$363,095.43 was for the canal, and the balance, \$2,610,833.85, for the dam and appurtenant work.

The completed project will furnish 74,000 acre-feet of stored water as a late season or supplemental supply for 60,000 acres of land in the lower Weber and Ogden Valleys and will divert surplus flood water and Echo Reservoir exchange water through a diversion canal 9 miles long from the Weber River watershed to the Provo River for a supplemental supply for 17,000 acres in the Provo Valley.

A contract for the repayment of the cost of the project was made with the Weber River Water Users' Association. At the end of the fiscal year the association had disposed of 94.1 per cent of the stock, or 69,659 shares out of a total of 74,000.

Construction of Echo Dam was completed on October 7, 1930. The construction of the parapet wall across the top of the dam, which will complete the structure, was withheld from the contract, awaiting such time as the dam has ceased to settle appreciably.

A road serving the farms on the west side of Echo Reservoir to replace roads formerly used through the reservoir area was 75 per cent completed at the end of the fiscal year, having been completed to such a point prior to the spring run-off as to provide for the permissible 50,000 acre-feet storage had such an amount been available. However, the lowest run-off year of record was encountered this spring and the reservoir filled to only the 19,200 acre-foot mark.

The Weber-Provo Diversion Canal was completed on April 23, 1931. The present construction is for 210 second-feet, the ultimate 1,000 second-feet capacity awaiting the future construction of the Deer Creek Reservoir on the Provo River.

STRAWBERRY VALLEY PROJECT, UTAH

Economic.—After satisfying all water-right contracts on the project, the available water in Strawberry Reservoir will have been used by the end of the irrigation season. The precipitation for the year was about 30 per cent normal, with a corresponding yield from Strawberry

Reservoir. The crop yield was below average, particularly that of alfalfa hay. A number of the larger farms were subdivided, resulting in more intensive cultivation. The number of tenants decreased. State-wide cooperative marketing associations handled most of the more intensively cultivated crops as well as poultry products.

Engineering.—Construction was completed in 1918. Since that time only minor betterments have been made to the works. Appropriate measures have been taken to conserve the water supply by adjusting water rights and by improved distribution. These measures include trading stored water for high water in the Spanish Fork River on a percentage basis, and discontinuing the use of stored water for power purposes, made possible by an interconnection with the Utah Power & Light Co. for the intersale of power which incidentally furnishes the project power plant with complete breakdown service. Some engineering data have been collected on the feasibility of augmenting the present water supply by pumping wells and drains and the winter flow from the Spanish Fork River to storage.

OKANOGAN PROJECT, WASHINGTON

Economic.—The crop census of 1930 showed a slight decline in the project population caused by the abandonment of unfit areas and the cancellation of water rights on farms to which the district had acquired title through nonpayment of assessments.

The fruit evaporating plant at Omak was considerably enlarged during the fall of 1930. A cold-storage plant for fruit was erected at Omak. The fruit crop will be considerably larger than last fall with the prospect, at the end of the fiscal year, of better prices.

Engineering.—The chief engineering need of the project is improvement of the distribution system to cut down seepage loss and permit delivery of a larger proportion of the available water. The only available source of additional water is the Okanogan River, and pumping this water under lifts of 450 to 500 feet is costly. Approximately \$20,000 was spent in the spring of 1931 on distribution system improvements, and next year's budget will carry as large an amount as can be spared for concreting laterals and canals and replacing worn-out pipe lines.

YAKIMA PROJECT, WASHINGTON

Economic.—Practically all farms capable of being cultivated under recent economic conditions were being farmed on the Sunnyside and Tieton divisions. Some of the poorer lands and others burdened with high local improvement assessments were being abandoned on the Sunnyside division and allowed to go to the county and the districts for taxes. The transfer of water rights from unproductive land for

use as a supplemental supply on the good land, in accordance with regulations issued by the Secretary under date of May 31, 1927, resulted in a further reduction in the irrigable area on the Tieton division.

The several districts under the Sunnyside division instituted negotiations during the year for the purchase of additional supplies of water to be furnished out of the present available storage capacity and from the proposed enlarged Cle Elum Reservoir.

Yields on soft fruits on the Sunnyside division were reduced by frost damage to trees during the previous winter as well as late spring frosts in 1930. The lower price level, however, was mainly responsible for the decline from the previous year of 42 per cent in the total crop and per acre values for this division.

On the Tieton division the yields of fruits continued to increase over those for previous years. The returns on fruits grown on 65 per cent of the gross area cropped amounted to 91 per cent of the total crop valuation. Considering the high proportion of lands utilized for the production of fruit, especially apples, this division, as a whole, experienced about an average year from a financial standpoint. The average value of all crops for the division was \$134.98 per acre.

Two factors contributed to the fairly favorable situation with reference to the project apple crop: First, the export trade, and second, the advertising campaign conducted by the Northwest Boxed Apple Bureau, a cooperative organization among shippers, with a view to increasing sales. As a result, the apple crop was cleaned up at fair prices, but practically all other crops and products moved slowly. A decline in the price of butterfat to the pre-war level brought about the most discouraging situation that has confronted the dairymen for a number of years.

A normal increase was noted in the warehouse, cold-storage, and packing-plant facilities for handling fruit and other produce. The installation of improved irrigation systems, extension of power lines, and construction of other improvements were continued with a fair degree of activity in the orchard districts.

At the opening of the irrigation season of 1931 there was every indication that the water supply would be short with a precipitation record at the five main reservoirs showing only 58 per cent of normal on March 1. The situation had been considerably improved, however, by the end of the fiscal year by additional rainfall and favorable weather conditions, so that no serious loss of crops will result. The distribution of the reduced water supply was handled with the cooperation of representatives of the Yakima Valley Federation of Irrigation Districts. The federation was organized in 1929, and has been instrumental in securing needed legislation for the benefit of irrigation districts in addition to bringing about a better feeling of mutual understanding among the various irrigation interests in the valley.

Engineering.—Repair of pipe lines and other structures was continued on the Sunnyside and Tieton divisions. Major items of construction consisted of the rebuilding of the transition at the intake of the lined section on the Tieton Canal and the building of a fish ladder at the Wapato Dam for the Bureau of Fisheries. The replacement of the river crossing of the Mabton siphon was completed and put into operation at the opening of the irrigation season. Clearing of reservoir areas at Keechelus and Kachess was continued. The construction of a camp was in progress for carrying out a 3-year program of clearing remaining at Lake Kachess. A permanent residence was constructed for the reservoir superintendent at Tieton Dam.

Applications were filed with the State supervisor of hydraulics for permits to appropriate the public waters of the Yakima River. An engineering and economic board held one meeting during the year to give further consideration to the feasibility of the new divisions, particularly the Roza division for which additional State legislation is required.

KITTITAS DIVISION

Economic.—At 6 p. m., June 6, water was turned into the Yakima River pressure tunnel and at 1 a. m., June 7, the first water was delivered to the North Branch Canal. By June 16 satisfactory water deliveries were being made to all lands entitled to water between Yakima River Tunnel and Wippel Creek. Irrigation water was delivered to 39 water users under the Main Canal, to 97 water users under the South Branch Canal, and to 216 water users under the North Branch Canal. On June 30, a total of 36,052 acres of land was under irrigation, 1,667 acres under the Main Canal, 11,276 acres under the South Branch Canal, and 23,109 acres under the North Branch Canal.

During the year the Northern Pacific Railway Co. and its subsidiary, the Northwestern Improvement Co., sold at the appraised valuation approximately 5,500 acres of irrigable land. The bulk of the land sold was in the Park Creek and Badger Pocket areas. Clearing of timber and sagebrush from privately owned lands continued. During the year the Ellensburg Chamber of Commerce replied to about 500 inquiries. At the end of the fiscal year a few tracts of privately owned land were being offered for sale.

As the main body of land in the Kittitas division practically surrounds an area which has been successfully farmed under private irrigation systems for a long period of years, the matter of providing financial and other assistance to project settlers is largely one of expansion of existing facilities. The present Kittitas County banks will serve as one source of credit, and farm loans from the local organization of the Federal Land Bank will no doubt be available in the

near future. The Farmers Loan Corporation was organized in 1928 to assist farmers in the purchase of livestock and at the end of the year was carrying loans in the amount of \$167,000. A savings and loan association with a capital stock of \$250,000 is another source of credit. The extension service, the Kittitas Farm Bureau, the county agent, and the agricultural departments of the Northern Pacific and Milwaukee Railroads cooperated in a program of assistance to farmers on economics, soil fertility, irrigation, and drainage. The Ellensburg Chamber of Commerce, the State department of agriculture, and local orchardists were instrumental in securing a 5-year fruit frost survey of project lands, to determine whether the lands will be adaptable to commercial fruit raising. This survey was started in the spring of 1931. The Kittitas County Dairymen's Association, with a capital of \$50,000, has been operating successfully since 1924. Last year Libby, McNeal & Libby established a small pickle-canning plant, and this plant will be opened again this fall.

Engineering.—Final location was completed of the three main laterals below the Wippel pumping plant. Construction was completed of the balance of the North Branch Canal and laterals to Wippel pumping plant, serving approximately 40,000 acres of irrigable land, and of the Yakima River Pressure Tunnel. Work was in progress on the construction of the turbine, gravity, and pump laterals under six small contracts. Work by Government forces included the priming and puddling of the completed portion of the canal and lateral systems; the construction of operation and maintenance roads; the installation of wooden flumes and bridges over laterals; the application of the protective tar coating to the inside concrete surface of siphons on the Main, South, and North Branch Canals; the construction of a branch telephone line from South Branch headworks to the outlet of Little Dry Creek siphon, North Branch Canal; the erection of fences at the inlet and outlet of siphons and tunnels, North Branch Canal; the erection of the transmission line across the Yakima River for the operation of the 42-inch internal differential needle valves at the Yakima River crossing wasteway; the placing of 525 linear feet of concrete canal lining on the South Branch Canal extension; and minor repairs.

It was expected that work on the Wippel pumping plant will be started this fiscal year.

RIVERTON PROJECT, WYOMING

Economic.—There was a marked increase in the number of farms and acreage under cultivation, and a corresponding improvement in farming methods and condition of crops. The greatest need is for settlers, both on public and private lands. The execution of a repay-

ment contract with the Midvale irrigation district was an important step in the development of the project.

Engineering.—Construction work was confined to contracts already in force and involved the completion of the Pilot Canal to mile 26 and the lateral system under that portion of the canal.

SHOSHONE PROJECT, WYOMING

Economic.—There were 860 farms under cultivation in 1930, of which 457 were operated by owners and 403 by tenants. Tenant farmers decreased by 10, and there were 22 more owners in 1930 than in the previous year. The number of settlers in the Willwood division increased from 45 to 64, and the area under cultivation from 2,700 to 4,000 acres.

Fortunately nearly all crops were sold at a good price and before the big drop in the market. Owing to this and the fact that good crops were harvested, the value of all crops by divisions was greater than in 1929.

There was no material change in the number of livestock on the project. However, as the value of all livestock was less per head there was a loss of \$168,000 compared with the inventory value of 1929.

Shipments from the project amounted to 2,347 carloads, which included 342 cars of crude oil, and incoming shipments to 588 carloads. During the year Castberg's Creamery manufactured 93,380 pounds of butter and 9,195 gallons of ice cream.

The closing down temporarily of activities in the oil industry, where the principal power is electricity, resulted in 1,459,686 less kilowatt-hours being generated in the fiscal year 1931 than in 1930.

On June 1, 1931, part 4 of the Willwood division consisting of 35 farm units and 2454.10 irrigable acres, was opened to entry.

Engineering.—The drainage-construction program on the Garland division was completed in the fiscal year 1931. There were, with the appurtenant structures, 149.30 miles of open and 134.23 miles of closed drains on this division.

On the Willwood division 6.53 miles of open drains and 0.02 mile of closed drains were constructed. There were installed 107 small structures, a major portion being on part 4. During the fiscal year 1932 it was planned to complete all laterals with appurtenant structures other than lateral W-113, where there are four farm units and 282 irrigable acres of State land. A small drainage program was also planned for this division. The total estimated cost of both drainage and lateral construction for the fiscal year 1932 is \$22,000.

A third unit of 5,000-kilovolt-ampere capacity was being installed at the Shoshone power plant, and at the end of the fiscal year was nearly completed.

SECONDARY INVESTIGATIONS

Funds for the investigation of prospective projects and kindred work are derived from appropriations by Congress, from contributions by States and other organizations for expenditure by the Bureau of Reclamation, and by direct payment by States and other organizations to personnel operating under the direction of or in cooperation with the bureau. Additional data become available for use by the bureau as the result of work by other agencies wholly independent of the bureau's activities, involving the expenditures of large amounts which are not reported to the bureau. Federal funds for work done during the past fiscal year as hereafter described, including All-American Canal investigations, were available from the acts of March 26, 1930, May 14, 1930, and March 4, 1931. Of \$126,872.67 disbursed by the bureau during the past fiscal year, \$80,559.24 was provided by the United States.

ARIZONA-NEW MEXICO

Upper Gila River investigations.—The investigations were completed and a report submitted in November, 1930, presenting the field data on all reservoir surveys to date. In the utilization studies particular attention was directed to a single reservoir site for the dual purposes of flood control, irrigation supply, and incidental power development.

The Gila-Frisco site, just below the junction of the Gila and San Francisco Rivers, and most favorably located for these purposes, was diamond drilled with rock found at a maximum depth of 127 feet. With the comparatively long and high dam required, and the extensive stripping of canyon walls that would be necessary to obtain good foundations, this site was concluded to be out of the question because of cost, and no plan or estimate was prepared. Plans and estimates for a reservoir of 320,000 acre-feet capacity at the Cliff site indicate a cost of \$8,598,000 for the dam and \$557,000 for a power plant. It was concluded that \$2,900,000 of the cost of the dam might be charged to flood control and that the remaining cost is too much to be repaid from power sales and irrigation benefits. It was recommended that further consideration be given, (1) to a flood-detention dam at the Gila-Frisco site and thereby to alleviate flood damage in the Safford Valley, and (2) to a smaller reservoir at the Cliff site to provide a supplemental water supply for irrigation purposes.

The total cost of the investigation upon completion was \$28,522, of which one-half was borne by the United States and the balance equally by New Mexico and Arizona.

CALIFORNIA

Sacramento-San Joaquin Valley investigations.—Foundation explorations were made for the Table Mountain dam site on Sacramento River. Planetable surveys were made of the Temperance Flat Dam

and Reservoir site on San Joaquin River and preliminary designs and estimates were prepared for the Table Mountain, Temperance Flat, Friant, and Pine Flat Dams.

A classification of lands in the Sacramento and San Joaquin Valleys was made by the Bureau of Soils. An economic study was made of the 700,000 acres in Madera, Fresno, and Tulare Counties, with special attention to lands in immediate need of a supplemental water supply, primarily because of overdraft on ground water from which they derive their supply by pumping.

Water-supply studies were conducted to determine the surplus waters available on the San Joaquin and Kings Rivers, and utilization thereof with the aid of storage at the Friant, Temperance Flat, and Pine Flat Reservoir sites, together with possible power output at the various dams.

Expenditures for the fiscal year were \$24,052, making the total cost of these investigations \$28,165, which was borne equally by the bureau and the State of California in accordance with the terms of contract dated May 15, 1930.

Palo Verde and Cibola Valley investigations.—Field work was commenced in May, 1930. An inspection was made of the irrigation, drainage, and present levee systems in the Palo Verde Valley and data were collected pertaining to the financial condition of the district. An aerial-photographic map of the river and valleys was prepared, 19 gages were established at regular intervals along the Colorado River from Blythe intake to Laguna Dam, and readings of river elevations secured during July and August to determine the river profile after the flood flow had receded.

A report on these investigations submitted in September, 1930, concluded that the Palo Verde Valley was in immediate need of additional levee construction, estimated to cost \$35,000, and if a series of high flood years should occur additional drainage construction would be required to the extent of \$133,500. The condition of the district is such that an immediate financial adjustment is necessary to enable it to continue functioning. The Cibola Valley has 15,000 acres of unimproved lands, which could be reclaimed by levee and drainage systems, although such work is considered financially infeasible. Expenditures for these investigations were \$5,096.

IDAHO

Boise project—Twin Springs Reservoir investigations.—Preliminary designs and estimates were prepared for a reservoir with a capacity of 145,000 acre-feet which from water supply studies was concluded to be the most practicable capacity to augment the water supply for the project and permit a partial development of the Hillcrest division, such capacity including 20,000 acre-feet of dead storage for

power-head purposes. Consideration was given to power output and market and of the division of costs between irrigation and power. Completion of the report is being delayed by a recently discovered lack of agreement in the data of the various separate surveys of the dam site and the reservoir site.

Rathdrum Prairie project investigations.—This project is being considered in connection with the Columbia Basin project investigations. Field investigations are being conducted to determine the practicability of furnishing a supplemental supply for the 10,000 acres now being irrigated by pumping from Hayden Lake, together with a full irrigation supply for a large additional irrigable area in this vicinity. Two irrigation plans are being considered—one by pumping from Lake Pend O'Reille, and the other by gravity from Priest Lake.

Preliminary studies have been made of the power available at the Albany Falls and Cabinet Gorge sites on Clark Fork of the Columbia, which could be utilized for pumping purposes.

A reconnaissance land classification is under way to determine the approximate area and extent of irrigable lands, and alternative canal lines have been run from Priest Lake to Rathdrum Prairie. A survey is being made of Priest Lake to determine the damages which would result if the lake were raised to furnish the necessary storage supply.

Expenditures during the fiscal year were \$3,143.

Lewiston Orchards irrigation district.—At the request of the Lewiston Orchards irrigation district an inspection was made of the project from March 31 to April 4, inclusive, and a report thereon transmitted in April, 1931. The district is not in need of a supplemental water supply. The irrigation system is well maintained and efficiently operated. The economic and financial condition of the district is such that interest and amortization payments on the irrigation bonds are difficult to meet. The situation is one which can best be remedied by a suitable adjustment between the irrigators and the bondholders.

Big Lost River investigations.—A report submitted in August, 1930, suggested the following means of improving the water supply for lands already under operating canals:

- (1) Adoption of a practice of spreading all surplus river waters, whenever available, upon the valley lands to replenish ground waters;
- (2) Elimination of unneeded canals;
- (3) Reduction of canal losses;
- (4) Pumping from ground water in selected localities;
- (5) Reduction of Mackay reservoir losses.

At the request of the Big Lost River Reclamation Association and of congressional representatives for the State of Idaho, the hydraulic engineer was designated by the bureau to serve as a member of an

engineering board which convened at Mackay, Idaho, to consider means of improving irrigation conditions on the Big Lost River.

A report submitted by the board in May, 1931, concluded that the valley water supply could not be greatly improved except by purchase of the Mackay Dam and Reservoir so that the use of its waters could be transferred to valley lands. It was further suggested that irrigation of lands in the lower part of the valley should be concentrated in the Island and Blaine Canals while by-pass channels appeared desirable around river sections subject to heavy losses.

IDAHO-NEVADA

Duck Valley project.—A land classification and an economic survey were made and a report thereon prepared in May, 1931, of the area proposed to be irrigated within the Shoshone Indian Reservation with waters from a reservoir to be constructed above the Owyhee River by the United States Indian Irrigation Service. Investigations show that the irrigable area is limited to 11,800 acres of Classes I and II bench land and 20,200 acres of overflow meadow land, and that such lands could repay construction charges to the extent of \$1.50 and 50 cents per acre, respectively, annually. Crops would be limited to garden stuff for local consumption and native hay for the winter feeding of livestock. It was concluded that sufficient storage to insure a full irrigation season supply to 5,000 acres of bench land would be ample for the needs of the Indians for a long time to come.

The Indian Service cooperated in these investigations to the extent of furnishing transportation and an Indian helper.

The cost of these investigations was \$1,119.

NEVADA

Humboldt River investigations.—On April 16, 17, and 18 the hydraulic engineer and the assistant director of reclamation economics made a reconnaissance trip through the valleys of the Humboldt River and its principal upper tributaries. Depletion of ground water due to a series of poor precipitation years and lack of large areas of high altitude on which run-off is most persistent in subnormal periods of rainfall have caused an accentuated shortage of water more serious than general throughout the west, run-off for 1931 being only 10 per cent of normal. A report prepared in April, 1931, concluded that opportunities are sufficiently promising to warrant further and detailed investigations by the bureau in cooperation with the State of Nevada.

NEW MEXICO

Middle Rio Grande investigations.—Hydrographic studies preparatory to the completion of the final report on these investigations were completed in the Denver office. Consideration was given to the effects of the construction plan as finally adopted by the Middle Rio Grande

conservancy district on the silt inflow to the Elephant Butte Reservoir.

OREGON

Deschutes project investigations.—At the request of the chamber of commerce of Bend a brief inspection was made of conditions on seven irrigation districts along the Deschutes River from Bend to Madras, Oreg., where declining stream flows due to persistent subnormal precipitation and adverse outcome of water adjudications have resulted in water shortages for some areas. Other areas are financially distressed and practically all are in arrears in payment of bond interest and principal, resulting from ill-conceived plans in their original development. Possibilities for supplemental storage are unpromising because of prevailing leaky lava formations and the inability of the lands to pay large amounts of storage.

The cost of this investigation was \$409.

UTAH

Gooseberry reservoir.—A geological examination was made of the proposed dam and reservoir site showing favorable conditions. The dam site by topography is best suited to an earth-fill dam, although little material suitable for such a dam was found in the immediate vicinity. A survey was made and preliminary cost estimates were prepared for a 15-mile canal from Cottonwood Creek to Spring City to distribute stored waters after delivery to Cottonwood Creek by a 4,000-foot tunnel from the reservoir. A report on this project must await further stream measurements to enable determination of reservoir yield. Expenditures during the fiscal year amounting to \$1,019 were paid by the State of Utah under contract of June 24, 1927.

Moon Lake investigations.—A reconnaissance land classification and an economic survey were made of the lands to be served from the reservoir. The report of February, 1931, thereon found that the 24,300 acres of benefited irrigable land would need on an average 1 acre-foot of storage per acre of land and could pay \$1.25 annually per acre for such storage. Although the engineering report has not been completed, it is apparent that such payments would complete repayment within the maximum 40-year period permitted by law. A reconnaissance was made to determine the possibility of a canal to deliver about 6,000 acre-feet of stored water annually to the Uintah River lands where a market is believed to exist for such water. Hydrographic studies were conducted of storage requirements for the irrigable area set forth in the land classification report and of reservoir operations. The engineering report on these investigations is practically complete.

Expenditures for the fiscal year were \$1,628, of which \$1,500 were made in pursuance of contract of July 22, 1930, providing for equal

distribution of cost between the United States and the State of Utah, and the balance was from funds advanced by the State of Utah in accordance with contract of June 24, 1927.

Cache Valley project.—Location surveys were made and cost estimates prepared for extensions to the Logan & Northern Canal and Providence-Milleville Canal and for the Paradise Feeder and Sterling Bench Canals. Measurements were made of the flow in Little Bear River to determine the extent to which such waters could be used for exchange and diversion into Paradise Feeder and Sterling Bench Canals. A reconnaissance was made of Logan Canyon and its tributaries to locate additional dam and reservoir sites, but without success.

The prospective water users in the northern part of the valley eventually withdrew from the water users association, after which interests in the vicinity of Mendon and Wellsville formed the Hyrum Reservoir Water Users' Association and asked that consideration be given to a project to use the Hyrum Reservoir in the vicinity of Hyrum and on lands south of Little Bear River to Mendon. The necessary canals were under consideration at the close of the year. Costs for the fiscal year amounting to \$2,316 were met equally by the State of Utah and the bureau under terms of contract of May, 1929.

Ogden River project.—Location surveys were made and cost estimates prepared for the proposed North and South Ogden Highline Canals, pipe line from Huntsville Reservoir to the mouth of the canyon, and extension of the North Ogden Canal to Brigham City, Utah. A reconnaissance land classification was made for the upper and lower Ogden Valleys and for about 11,000 acres in the proposed extension of the North Ogden Canal in the vicinity of Willard and Brigham.

Surveys were made of two additional reservoir sites on the South Fork of Ogden River above the Magpie site. A relocation survey was made of the highway around the Huntsville reservoir. A detailed survey was made of the Huntsville Dam site and geological examination made and foundation drilling operations were carried forward to determine the bedrock conditions at the Huntsville Dam site. An appraisal was made of the lands which would be inundated within the Huntsville Reservoir site.

Water supply studies were initiated to determine the storable inflow to the various reservoirs and the requirements and use of water for the project lands.

In the Denver office preliminary designs and estimates were prepared for the Skull Creek, Huntsville, and Magpie Dams.

Expenditures for the fiscal year amounting to \$9,147 were met equally by the bureau and the State of Utah in accordance with terms of contract of May, 1929.

Provo River investigations.—Preliminary cost estimates were prepared for enlarging Weber-Provo diversion canal and for the con-

struction of a new siphon across the Jordan Narrows. A reconnaissance economic survey was made to determine how much the lands could pay for stored waters. A study was made of the power market and value of electrical energy which could be produced at the Deer Creek Reservoir site.

Water-supply studies were conducted to determine the storable inflow to the reservoirs and project requirements. An irrigation plan was determined for the proposed project and a report thereon was practically complete at the close of the year.

Expenditures for the past year were \$4,739, which were met equally by the United States and the State of Utah in accordance with contract of May, 1929.

WASHINGTON

Columbia Basin project investigations.—Investigations were initiated in September, 1930. A general field reconnaissance was made of the various project units to ascertain the general relationship of the lands to be served, proposed canal lines, and reservoir sites. This inspection included the proposed pumping units as well as the gravity units. Consideration was given to the utilization of the Winona and Wiedrich Reservoirs on Palouse River for the irrigation of lands north of Pasco, with provisions for subsequently utilizing these reservoirs to reregulate waters proposed to be brought in during off-peak seasons from Pend O'Reille and Spokane Rivers for full development of such lands.

Expenditures for the fiscal year were \$5,059.

Burbank Irrigation District.—An investigation was initiated on this district, which has been passing out of operation, to determine ways and means for its rehabilitation. Lack of soil fertility and wind movement were set forth as the principal causes of the failure of the Burbank district. It was concluded that about 1,000 of the 10,000 acres included in the district have sufficient soil fertility to warrant reclamation.

WYOMING

Saratoga project.—Topographic and economic surveys and a land classification were made of the irrigable area. Proposed canal lines were located and surveyed; detailed topographic surveys were made of a contemplated tunnel site on the main canal and of the diversion dam site; and a test well was dug to determine foundation conditions at the dam site. Plans and estimates were prepared for the main canal and the diversion dam, and water-supply studies completed of project supplies. The land classification and economics report was issued in December, 1930, and the engineering report in January, 1931.

The project will receive its water supply from the direct flow of the North Platte River by means of a diversion dam at Baggotts Rocks and a main canal 41 miles long with an initial capacity of 520 second-feet. The project contains 31,000 acres of irrigable land, all of which

is at present undeveloped sagebrush land. The project cost is estimated at \$105 per irrigable acre, including an item of \$8 per acre to provide for replacement storage to offset shortages on present downstream projects through depletion caused by the contemplated project. The principal crops will be hay, grain, tame pasture, seed peas, and potatoes, and it is estimated that the lands can support annual assessments of \$3 per acre, of which \$2 could be applied for repayment of the construction charge. These investigations were undertaken pursuant to joint resolution of Congress approved June 7, 1924 (43 Stat. 668), and a contract with the State of Wyoming dated May 1, 1929, providing for equal division of costs. Total expenditures thereunder were \$15,250, of which \$8,238 was made during the past fiscal year.

Greybull Valley investigations.—This work was undertaken in pursuance of the cooperative contract of May 1, 1929, with the State of Wyoming after completion of work on the Saratoga and Casper-Alcova projects. The investigation is directed to means of furnishing a supplemental storage supply for lands now being irrigated from the Greybull River. Field work was initiated in October, 1930. Topographic surveys were made to obtain additional information on the Upper and Lower Sunshine Reservoirs and lines were surveyed for the proposed feeder canals from Greybull and Wood Rivers. Test pits were dug and a geological examination made of these sites to determine the depth to and character of bedrock, which was found to be unsuitable for dam foundations. A land classification and economic survey of the project lands indicated 38,000 acres now irrigated and 8,000 acres now seeped but susceptible of reclamation by drainage, suited for permanent cultivation.

After elimination of the possibility of utilizing Sunshine Reservoir consideration was given to the matter of furnishing water to these lands in connection with the development of the Oregon Basin division of the Shoshone project.

Expenditures for the fiscal year were \$3,411.

Shoshone project extensions.—Funds for these investigations have been entirely provided by the United States. All engineering and land classification data from previous investigations were assembled and supplemented by additional field work, mainly in regard to land classification on the Oregon Basin division and some additional topographical surveys along the proposed Heart Mountain canal line. Estimates were prepared for various alternative irrigation plans for the Heart Mountain division with the adoption of a 28-mile canal with initial capacity of 912 second-feet to supply water for 34,000 acres under the Heart Mountain division proper and an 8-mile extension to supply 7,000 acres on the Chapman Bench. On account of the excessive cost due mainly to a 35,000-foot inverted siphon with a maximum head of 300 feet, and a 19,000-foot tunnel, the Polecat Bench area of 23,000 acres was excluded from the project.

Irrigation plan and cost estimates for the Oregon Basin division will be worked out, water-supply studies prepared, and a report on these investigations completed in the next fiscal year.

Expenditures for the year were \$4,797.

North Platte River power investigations.—The second deficiency act for 1931 appropriated \$75,000 to be used for investigation of power possibilities on the North Platte River.

Field work on these investigations was initiated in April, 1931. A reconnaissance was made of the North Platte Canyon from the North Park dam site to French Creek and through the Seminole and Fremont Canyons to locate additional dam sites to be investigated for the utilization of the fall in the North Platte River. Topography on the scale of 1,000 feet per inch was taken of the 8 miles of river through Seminole Canyon to Pathfinder Reservoir, and detail topography obtained of dam sites in Seminole and Fremont Canyons.

Drilling operations were commenced at the Granite dam site in Seminole Canyon to determine foundation conditions.

Upon completion of field work, designs and estimates will be prepared for dams and power plants at the various sites; hydrographic studies conducted to determine possible power output; and a study made of power markets, after which a full report will be submitted.

Expenditures for the fiscal year were \$5,731.

Respectfully submitted.

ELWOOD MEAD,
Commissioner.

TABLES

RECLAMATION TABLE 1.—*Consolidated financial statement, June 30, 1931*

	DEBIT SIDE	
Construction account:		
Primary projects—		
Cost of irrigation works—		
Original construction.....	\$191,796,784.35	
Supplemental construction.....	12,188,114.63	
Value of works taken over.....	2,056,623.22	
Total construction cost.....		\$206,041,522.20
Operation and maintenance prior to public notice (net).....	2,754,625.76	
Operation and maintenance deficits and arrearages funded with construction.....	4,771,189.71	
Penalties on water-right charges funded with construction.....	1,309,936.32	
		8,835,751.79
		214,877,273.99
Less—Income items—		
Construction revenues.....	5,948,382.03	
Contributed funds.....	1,457,959.63	
Nonreimbursable appropriation (Rio Grande Dam).....	1,000,000.00	
		8,406,341.66
		206,470,932.33
Less—		
Abandoned works, nonreimbursable cost, and charge-offs.....	15,418,966.63	
Balance payable.....		\$191,051,965.70
Yuma auxiliary project—		
Cost of irrigation works.....	893,411.93	
Less: Construction revenues.....	456.87	
		892,955.06

RECLAMATION TABLE 1.—*Consolidated financial statement, June 30, 1931—Con.*

Secondary projects and general investigations—			
Cost of surveys and investigations	\$2,729,877.21		
Less: Contributed funds	518,121.37		
			\$2,211,755.84
General offices' expenses undistributed			924,522.46
Plant and equipment			763,263.57
Materials and supplies			360,682.98
Accounts receivable:			
Current accounts due	1,999,953.54		
Deferred accounts not due	155,205,234.87		
			157,205,188.41
Unadjusted debits: Disbursement vouchers in transit			11,707.02
Prepaid civil-service retirement fund			2,340.33
Cash:			
Balance on hand—			
Reclamation fund	\$4,684,674.15		
Yuma auxiliary fund	157,244.67		
Special funds	183,989.15		
		5,025,907.97	
In special deposit and in transit		4,283.26	
			5,030,191.23
Total debits			358,454,572.60
CREDIT SIDE			
Security for repayment of cost of irrigation works:			
Contracted construction repayments	\$196,661,828.35		
Yuma auxiliary contracted repayments	603,955.82		
			\$197,265,784.17
Current accounts payable			1,416,043.25
Deferred and contingent obligations			752,263.29
Reserves and undistributed profits			7,053,767.53
Unadjusted credits: Collection vouchers in transit			523.72
Undistributed clearing cost accounts			45,486.14
Operation and maintenance results, surplus			499,806.28
Government aid for reclamation of arid lands—			
Reclamation fund	151,694,084.72		
Special funds—			
Increase of compensation	2,797,960.33		
Rio Grande Dam	1,000,000.00		
Wind River Indian (Riverton)	359,176.04		
Judgments, United States courts	602,814.38		
Drainage and cut-over lands	99,815.08		
General investigations, 1923–Dec. 31, 1924	266,352.66		
Arid, semiarid, swamp, and cut-over timberlands	44,993.31		
Columbia Basin irrigation project	11,634.28		
Colorado River levee system	400,000.00		
		157,276,830.80	
Advances to reclamation fund—			
Bond loan	\$20,000,000.00		
Less: Amount repaid	10,000,000.00		
	10,000,000.00		
Treasury loan (act of Mar. 4, 1931)	2,000,000.00		
		12,000,000.00	
		169,276,830.80	
Less: Nonreimbursable appropriation, Rio Grande Dam		1,000,000.00	
		168,276,830.80	
Less: Impairment of funds—			
Abandoned works	1,352,108.00		
Nonreimbursable cost	608,799.46		
Operation and maintenance cost uncollectible	453,272.39		
Charge-offs, act of May 25, 1926	14,441,752.73		
		16,855,932.58	
			151,420,898.22
Total credits			358,454,572.60

RECLAMATION TABLE 2.—*Available funds, expenditures, and balances, fiscal year 1931*

Items	Funds					
	Reclamation	Yuma auxiliary	Arid, semiarid, swamp, and cut-over timber lands	Columbia Basin irrigation project	Colorado River levee system	Air navigation facilities (commerce)
Balance on hand July 1, 1930.....	\$5, 035, 343.37	\$163, 538.10	\$9, 076.25	\$13, 365.72	\$132, 805.09	-----
Receipts:						
Proceeds from sale of public lands.....	635, 290.72	-----	-----	-----	-----	-----
Proceeds from oil leasing act.....	2, 098, 855.96	-----	-----	-----	-----	-----
Proceeds from potassium royalties.....	11, 732.61	-----	-----	-----	-----	-----
Proceeds from Federal power licenses.....	212, 063.43	-----	-----	-----	-----	-----
From project collections.....	7, 409, 723.84	23, 922.30	-----	-----	-----	-----
From General Treasury.....	2, 000, 000.00	-----	6.69	13, 365.72	100, 000.00	\$2, 220.00
Total.....	17, 403, 009.93	187, 460.40	9, 069.56	-----	232, 805.09	2, 220.00
Expenditures:						
Repayment bond loan.....	-----	-----	-----	-----	-----	-----
Disbursements.....	12, 718, 335.78	30, 215.73	-----	-----	58, 292.37	1, 813.13
Total.....	12, 718, 335.78	30, 215.73	-----	-----	58, 292.37	1, 813.13
Balance on hand June 30, 1931.....	4, 684, 674.15	157, 244.67	9, 069.56	-----	174, 512.72	406.87

¹ Contra.RECLAMATION TABLE 3.—*Accretions to reclamation fund, by States*

States	Sale of public lands		Proceeds from oil leasing act		Potassium royalties and rentals ¹	Total to June 30, 1931
	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931		
Alabama.....	-----	-----	\$6, 813.96	\$66, 941.09	-----	\$66, 941.09
Arizona.....	\$69, 404.16	\$2, 522, 995.87	50.65	50.65	-----	2, 523, 046.52
California.....	80, 917.18	7, 982, 729.56	511, 554.33	8, 048, 301.91	\$80, 029.12	16, 111, 060.59
Colorado.....	53, 422.21	10, 143, 785.80	47, 086.58	367, 584.77	-----	10, 511, 370.57
Idaho.....	40, 161.91	6, 969, 499.72	3, 251.34	9, 298.04	-----	6, 978, 797.76
Kansas.....	-----	1, 032, 764.48	-----	-----	-----	1, 032, 764.48
Louisiana.....	-----	-----	1, 939.23	22, 352.94	-----	22, 352.94
Montana.....	62, 652.71	15, 177, 076.43	52, 158.99	963, 105.06	-----	16, 140, 181.49
Nebraska.....	1, 174.15	2, 094, 928.51	-----	-----	-----	2, 094, 928.51
Nevada.....	14, 660.58	1, 007, 472.60	62.75	3, 549.10	-----	1, 011, 021.70
New Mexico.....	100, 563.67	6, 338, 404.21	89, 058.36	207, 670.91	-----	6, 546, 075.12
North Dakota.....	5, 290.88	12, 217, 396.11	14, 847.48	79, 321.38	-----	12, 296, 717.49
Oklahoma.....	1, 114.49	5, 926, 388.90	-----	-----	-----	5, 926, 388.90
Oregon.....	34, 931.91	11, 918, 189.56	-----	-----	-----	11, 918, 189.56
South Dakota.....	4, 779.25	7, 720, 991.17	306.25	687.63	-----	7, 721, 678.80
Utah.....	41, 463.53	4, 152, 413.83	48, 934.71	270, 309.53	-----	4, 422, 723.36
Washington.....	17, 144.02	7, 419, 481.00	2, 583.02	17, 101.99	-----	7, 436, 582.99
Wyoming.....	107, 609.97	8, 333, 310.73	1, 320, 208.31	30, 328, 528.34	-----	38, 661, 839.07
Total.....	635, 290.72	110, 957, 828.48	2, 098, 855.96	40, 384, 803.34	80, 029.12	151, 422, 660.94
Proceeds, Federal water-power licenses.....	-----	-----	-----	-----	-----	² 271, 423.78
Grand total.....	-----	-----	-----	-----	-----	151, 694, 084.72

¹ Proceeds for fiscal year, \$11, 732.61.² Proceeds for fiscal year, \$212,063.43.

RECLAMATION TABLE 4.—Consolidated statement, by projects, of construction cost of irrigation works, other cost reimbursable with construction, and amounts to be repaid by water users

State and project	Construction cost		Operation and maintenance before publication notice (net)		Operation and maintenance deficits and arrearages and penalties		Construction revenues, contributed funds, and nonreimbursable appropriation (contra)		Abandoned works, nonreimbursable cost, and authorized charge-offs ¹	Total to be repaid by water users	
	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931		Fiscal year 1931	To June 30, 1931
Arizona: Salt River.....		\$12,744,222.59		\$115,983.50				\$2,312,096.81	\$382,097.31		\$10,166,021.97
Arizona-California: Yuma.....	\$13,007.15	9,365,824.72	\$221.25	373,806.77		\$2,921.96	\$2,995.64	220,153.25		\$9,790.26	9,592,400.20
California: Orland.....	4,366.75	2,399,823.22	959.88	1,432.99			1,392.72	27,707.88		3,733.91	2,306,182.35
Colorado: Grand Valley.....	15,802.43	4,796,810.00		138,621.28			4,473.94	59,192.83	812,374.64	11,328.49	4,063,863.81
Idaho: Uncompangre.....		6,438,176.91	102.50	303,006.46		8,238.88		24,223.72	1,298,712.73	1,287.35	5,466,485.80
Boise.....											
King Hill.....	1,006,624.38	15,989,970.11		422,283.48		875,739.23	946.60	75,529.12	82,393.84	1,005,677.78	17,130,069.86
Mindoka.....	600.00	1,905,918.80		110,122.51				28,187.27	421.04	1,490,389.98	
Mindoka-Gooding.....	92,484.56	14,789,159.52	\$544.86	321,337.24	\$5.02	467,836.00	7,157.01	1,744,229.58	2,288.15	99,091.69	13,831,815.03
Kansas: Garden City.....	1,834,699.99	3,725,518.48						1,000.00		1,834,699.99	3,724,518.48
Montana: Huntley.....		1,562,302.99		21,000.16				61,356.82	334,474.96		
Milk River.....	23,991.65	6,802,908.47	\$277.72	437,461.06		378,925.79		18,371.91	62,049.83		1,859,806.88
Sun River.....	380,568.43	7,332,450.50	\$143.79	133,317.61		100,393.62	3,024.23	89,683.75	1,911,189.00	20,689.70	5,339,890.40
Montana-North Dakota: Lower Yellowstone.....						22,109.79	1,295.80	47,254.65	89,214.47	401,343.86	7,431,705.54
Nebraska-Wyoming: North Platte.....	92,394.35	3,689,528.59	\$373.82	22,953.55		901,207.63	1,573.50	54,005.47	382,254.00	90,447.03	4,151,523.20
Nevada: Newlands.....	49,704.48	19,208,441.69	43,178.08	743,294.42		5,848.18	1,506,029.29	233,325.72	495,098.39	104,272.68	20,962,667.01
New Mexico: Carlsbad.....		7,856,917.16		2,155.44		20,405.33		52,347.53	4,437,820.00	1.15	3,484,999.52
Hondo.....	127.30	1,464,649.87		17,751.77		1,984.00	1,187.50	28,346.99		1,060.20	1,420,485.11
New Mexico-Texas: Rio Grande.....		339,491.68		32,932.01				636.03	371,787.66		
North Dakota: Buford-Prenton.....	90,165.71	14,965,439.84		297,857.81			27,088.53	1,413,925.16	326,900.97	32,577.18	12,946,755.90
Williston.....				231.75							
Oregon: Baker.....				165.00			2,917.12	93,043.40	221,423.69		
Umatilla.....	3,263.25	71,598.04							424,421.69		
Vale.....		5,137,937.20									
Oregon-California: Klamath.....	649,615.09	3,284,086.80	10,522.70	13,140.40		230,205.34	8,070.21	84,455.98	888,340.82	3,263.25	66,598.04
Oregon-Idaho: Owyhee.....	233,396.69	5,985,160.65	2,318.09	78,090.52		3,830.03	39,610.60	400,531.53	7,498.72	660,137.79	3,292,227.20
South Dakota: Belle Fourche.....	202,506.80	4,393,382.64		1,989.03						3,945,167.79	6,468,636.36
						669,943.43	712.42	18,554.44	379,031.58	201,794.38	4,663,731.02

See footnotes at end of table.

RECLAMATION TABLE 4.—*Consolidated statement, by projects, of construction cost of irrigation works, other cost reimbursable with construction, and amounts to be repaid by water users—Continued*

State and project	Construction cost		Operation and main- tenance before pub- lic notice (net)		Operation and main- tenance deficits and arrearages and penalties		Construction reve- nues, contributed funds, and nonre- imbursable appro- priation (contra)		Abandoned works, non- reimburs- able cost, and author- ized charge- offs ¹	Total to be repaid by water users	
	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931			
Utah:											
Salt Lake Basin.....	\$430, 904. 97	\$2, 793, 929. 28					\$160. 00	\$45, 495. 27		\$430, 744. 97	\$2, 748, 434. 01
Strawberry Valley.....		3, 507, 423. 49			\$10, 744. 06	\$10, 785. 51		258, 379. 12		10, 785. 51	3, 342, 028. 55
Washington:											
Okanogan.....		1, 451, 729. 45						6, 630. 78	\$998, 327. 20		424, 198. 97
Yakima.....	30, 922. 22	14, 529, 910. 32						308, 496. 07	4, 214. 60	27, 085. 73	14, 175, 974. 18
Yakima-Kittitas.....	1, 433, 798. 38	8, 006, 384. 39						3, 747. 92		1, 448, 512. 13	8, 011, 420. 44
Wyoming:											
Riverton.....	76, 827. 23	3, 879, 451. 47						16, 367. 87		86, 761. 65	3, 901, 054. 12
Shoshone.....	232, 843. 87	9, 946, 465. 53						340, 949. 89		283, 109. 40	8, 549, 666. 08
Total.....	10, 843, 783. 47	206, 041, 522. 20	33, 491. 48	2, 754, 625. 76	240, 691. 45	6, 081, 126. 03	588, 160. 25	8, 406, 341. 66	15, 418, 966. 63	10, 689, 695. 12	191, 051, 965. 70
¹ Abandoned works:											
Garden City.....										\$334, 474. 96	
Hondo.....										371, 787. 66	
Buford-Trenton.....										221, 423. 69	
Williston.....										424, 421. 69	
Nonreimbursable cost: Salt River.....											
										1, 352, 108. 00	
										382, 097. 31	

¹ Abandoned works:

Garden City

Hondo

Buford-Trenton

Williston

Authorized charge-offs, act of May 25, 1926:

Grand Valley-----	812,374.64
Uncompahgre-----	1,258,712.73
Boise-----	82,383.84
King Hill-----	497,464.06
Mimodoka-----	2,288.15
Huntley-----	62,049.83
Milk River-----	1,911,189.00
Sun River-----	89,214.47
Lower Yellowstone-----	382,254.00
Newlands-----	4,437,820.00
Rio Grande-----	326,900.97
Umatilla-----	888,340.82
Klamath-----	7,499.72
Belle Fourche-----	379,031.58
Okanogan-----	998,327.20
Yakima-----	4,214.60
Shoshone-----	1,544,685.71
	<hr/>
	13,684,761.32

* Contra.

RECLAMATION TABLE 5.—Consolidated statement, by projects, of operation and maintenance cost, operation and maintenance returns and other credits, and results, calendar year 1930

State and project	Cost	Operation and maintenance returns				Other credits ¹	Results excess (+) or deficit (-)
		Charges contracted	Penalties	Discounts (contra)	Misc. revenues		
Arizona: Yuma auxiliary.....	\$32,389.01	\$33,824.38			\$1,228.74		+\$2,664.11
Arizona-California: Yuma.....	338,936.28	316,742.81	\$3,443.36	\$5,338.63	11,731.42		-12,357.32
California: Orland.....	37,358.24	39,561.13	329.78	1,247.74	219.59		+1,504.52
Colorado: Grand Valley.....	48,912.71	49,375.00			655.00		+1,117.29
Uncompaghe.....	134,550.61	130,000.00	1.32		3,316.40		-1,232.89
Idaho: Boise.....	20,960.36	33,700.91					+12,740.55
Minidoka.....	68,805.28	68,805.28			13,613.35	\$127.66	-2,246.31
Minidoka-Gooding.....		757.38					+757.38
Montana: Huntley.....	\$ 2.76						+2.76
Milk River.....	40,046.56	42,041.48		194.25	452.42		+2,253.09
Sun River.....	24,081.10	817.20			922.88	22,022.88	-318.14
Montana-North Dakota: Lower Yellowstone.....	71,718.91	58,192.41			3,966.12		-9,560.38
Nebraska-Wyoming: North Platte.....	28,430.24	16,605.55			1,009.00	1,915.57	-8,900.12
Nevada: Newlands.....	300.00						-300.00
New Mexico: Carlsbad.....	48,491.75	56,507.03	881.41	1,162.77	558.18		+8,292.10
New Mexico-Texas: Rio Grande.....	373,605.52	781,526.52	68.83				+407,989.53
Oregon: Umatilla.....	3,871.75	3,658.63			18.64		-191.49
Oregon-California: Klamath.....	86,889.76	40,745.32	22.89		32,235.59		-7,885.96
South Dakota: Belle Fourche.....	89,225.18				2,494.62		-86,730.56
Utah: Strawberry Valley.....						10,790.46	+10,790.46
Washington: Yakima.....	315,293.01	280,079.34	5,148.04	3,821.70	6,831.91	59.81	-26,995.61
Yakima-Kittitas.....	28,556.78	19,752.81					-8,783.97
Wyoming: Shoshone.....	3,058.29	2,091.84			226.58	2 43.10	-1,236.13
Total.....	1,811,190.59	1,980,785.02	9,895.63	11,765.09	79,027.28	34,617.96	+281,370.21

² Contra.¹ Amounts to be repaid with construction and charge-offs under act of May 25, 1926 (44 Stat. 636).

RECLAMATION TABLE 6.—Consolidated statement, by projects, of operation and maintenance cost, operation and maintenance returns and other credits, and results to December 31, 1930

State and project	Cost	Operation and maintenance returns				Other credits		
		Charges con- tracted	Penalties	Discounts (contra)	Miscellaneous revenues	Deficits uncollectible	Amounts to be repaid with con- struction	Results, excess (+) or deficit (-)
Arizona: Yuma auxiliary.....	\$309,196.72	\$364,123.40	\$537.74	\$1,106.79	\$7,081.59	-----	-----	+\$61,439.22
Arizona-California: Yuma.....	4,391,012.25	4,458,673.08	98,293.66	58,267.40	186,515.82	-----	\$2,921.96	+297,130.87
California: Orland.....	457,332.26	488,122.33	1,843.52	20,687.25	3,099.54	-----	-----	+15,043.88
Colorado:								
Grand Valley.....	148,299.71	159,875.00	-----	-----	2,042.00	-----	-----	+13,617.29
Uncompahgre.....	1,073,947.19	1,199,019.83	11,236.87	11,602.77	21,728.50	-----	-----	+146,435.24
Idaho:								
Boise.....	2,789,238.42	2,108,717.41	69,769.20	52,649.72	111,044.96	-----	601,070.37	+49,713.80
King Hill.....	156,734.25	60,711.27	-----	1,519.05	342.89	-----	97,199.14	-----
Mimodoka.....	2,188,055.87	1,800,197.36	29,463.35	22,341.74	115,185.41	-----	266,605.54	+1,054.05
Mimodoka-Gooding.....	-----	757.38	-----	-----	-----	-----	-----	+757.38
Montana:								
Huntley.....	1,014,941.03	557,805.45	15,712.18	10,449.84	11,586.91	1,881,354.00	358,985.39	+53.06
Milk River.....	233,770.69	155,000.24	-----	1,559.50	5,042.19	-----	100,393.62	+25,105.86
Sun River.....	316,757.49	158,971.46	6,360.24	3,468.33	29,741.54	134,148.00	90,544.63	-469.95
Montana-North Dakota: Lower Yellowstone.....	1,291,996.87	318,257.64	2.59	4.63	134,225.16	-----	861,460.22	+21,944.11
Nebraska-Wyoming: North Platte.....	2,768,486.99	1,814,899.22	27,304.03	35,811.80	31,076.41	-----	1,043,085.97	+112,066.84
Nevada: Newlands.....	1,453,490.54	1,188,795.72	28,660.62	24,970.08	26,012.61	1,211,292.00	15,876.45	-7,823.22
New Mexico: Carlsbad.....	863,473.50	815,281.52	29,165.55	16,587.74	25,770.56	-----	1,934.00	-7,909.61
New Mexico-Texas: Rio Grande.....	3,080,471.37	3,027,302.77	8,596.92	4,486.44	49,058.12	-----	-----	-----
North Dakota:								
Bulford-Trenton.....	74,781.07	2,317.41	-----	-----	10.00	1,72,453.66	-----	-----
Williston.....	904,662.04	34,042.75	45.81	-----	489,754.75	238,818.73	-----	-----
Oregon: Umatilla.....	691,520.03	369,107.27	7,697.84	3,314.38	39,837.54	1,91,083.35	197,132.52	+10,024.11
Oregon-California: Klamath.....	1,195,480.78	1,118,917.58	3,617.98	4,942.27	118,510.97	-----	3,712.03	+44,335.51
South Dakota: Belle Fourche.....	1,544,340.29	817,308.18	29,196.35	9,240.72	25,975.07	119,606.00	570,194.90	+8,699.49
Utah: Strawberry Valley.....	437,856.39	376,880.88	10,196.17	11,858.67	20,400.30	-----	42,237.71	-----
Washington:								
Okanogan.....	649,647.22	371,441.72	1,451.15	397.47	70,485.39	118,472.06	25,194.37	+46,143.23
Yakima.....	4,391,378.79	4,200,743.07	86,218.50	54,934.58	130,736.49	-----	74,758.54	-8,783.97
Yakima-Kittitas.....	28,536.78	19,752.81	-----	-----	-----	-----	-----	-74,643.11
Wyoming: Shoshone.....	913,426.12	540,783.73	13,614.85	11,052.86	41,392.57	138,036.00	216,108.72	+754,036.08
Total.....	33,368,844.66	26,528,806.48	478,991.12	361,254.03	1,696,657.29	1,210,263.80	4,569,416.08	-----

² Projects abandoned.

¹ Charge-offs under act of May 25, 1926 (44 Stat. 636).

RECLAMATION TABLE 7.—*Accounts receivable, construction water-right charges (including contributed funds)*

State and project	Due		Collected			Uncollected June 30, 1931
	Fiscal year 1931	To June 30, 1931	Cash		Other credits to June 30, 1931	
			Fiscal year 1931	To June 30, 1931		
Arizona:						
Salt River-----	\$1,219,922.64	\$7,116,215.41	\$1,829,883.96	\$7,116,215.41		
Yuma auxiliary-----	12,013.80	588,263.46	12,025.32	584,978.09	\$1,584.05	\$1,701.32
Arizona-California: Yuma--	341,861.74	3,924,904.19	177,882.26	3,338,905.10	428,375.77	157,623.32
California: Orland-----	64,156.00	767,470.19	55,095.09	740,070.73		27,399.46
Colorado:						
Grand Valley-----	100,233.85	160,219.93	35,184.05	79,237.50	48,539.99	32,442.44
Uncompahgre-----	119,046.11	826,817.82	298.21	427,820.22	62,865.05	336,132.55
Idaho:						
Boise-----	373,842.21	3,789,289.28	372,739.74	3,758,417.52	25,499.58	5,372.18
King Hill-----	16,750.00	50,575.66		8,025.66		42,550.00
Minidoka-----	183,818.54	7,968,471.79	179,407.58	7,535,584.53	374,849.34	58,037.92
Minidoka-Gooding-----	21,680.36	280,580.36	21,680.36	280,580.36		
Montana:						
Huntley-----	9,463.22	542,102.13	7,309.98	456,578.51	85,167.15	356.47
Milk River-----		3,002.76		3,002.76		
Sun River-----	7,899.27	202,340.05	7,708.61	200,418.85	1,125.60	795.60
Montana-North Dakota:						
Lower Yellowstone-----	65,311.04	284,011.51	66,131.95	280,209.13		3,802.38
Nebraska-Wyoming: North Platte-----	243,330.59	3,065,147.31	184,687.23	2,738,231.35	260,646.59	66,269.37
Nevada: Newlands-----	85,509.97	1,053,291.08	75,202.54	1,014,758.75	35,756.03	2,776.30
New Mexico: Carlsbad-----	68,051.10	928,221.69	60,632.45	885,411.79	81.25	42,728.65
New Mexico-Texas: Rio Grande-----	543,591.64	3,313,726.00	544,157.71	2,962,977.51	311,671.64	39,076.85
Oregon:						
Baker-----		5,000.00		5,000.00		
Umatilla-----	29,511.21	483,424.85	8,905.67	396,682.77	1,693.34	85,048.74
Vale-----		5,000.00		5,000.00		
Oregon-California: Klamath-----	77,705.35	1,135,612.62	57,934.29	1,062,195.84		73,416.78
Oregon-Idaho: Owyhee-----		4,354.61		4,354.61		
South Dakota: Belle Fourche-----	58,617.41	644,628.27	55,939.57	570,083.15	74,545.12	
Utah:						
Salt Lake Basin-----		44,756.77		44,756.77		
Strawberry Valley-----	107,804.06	1,210,445.91	103,125.66	1,189,233.01	8,214.00	12,998.90
Washington:						
Okanogan-----	10,425.94	141,217.39	425.94	131,217.39		10,000.00
Yakima-----	445,646.61	6,597,240.10	435,752.08	6,358,216.07	36,047.07	202,976.96
Yakima-Kittitas-----		1,000.00		1,000.00		
Wyoming: Shoshone-----	42,842.28	824,074.57	42,356.80	819,855.68	3,566.08	652.81
Total-----	4,235,007.34	45,961,405.71	4,320,416.41	42,999,019.06	² 1,760,227.65	1,202,159.00
Paid in advance of due dates-----			15,747.08	145,750.13	³ 282,145.85	
Refunds-----			1,420.85	98,591.20	3,212.84	
Total collections-----			4,337,584.34	43,243,360.39		

¹ Contra.² Other credits for fiscal year \$343,828.47.³ Increase for fiscal year, \$113,841.36.

RECLAMATION TABLE 8.—*Accounts receivable, operation and maintenance charges (after public notice)*

State and project	Due		Collected			Uncollected June 30, 1931
	Fiscal year 1931	To June 30, 1931	Cash		Other credits to June 30, 1931	
			Fiscal year 1931	To June 30, 1931		
Arizona: Yuma auxiliary	\$29,643.06	\$388,174.78	\$28,625.18	\$368,931.45	\$13,388.30	\$5,855.03
Arizona-California: Yuma	49,789.61	3,237,665.32	38,852.93	3,065,037.30	94,877.21	77,750.81
California: Orland	39,561.13	488,122.33	31,955.02	452,097.84	20,691.15	15,333.34
Colorado:						
Grand Valley	47,500.00	195,500.00	49,500.00	190,500.00		5,000.00
Uncompahgre	169,134.08	1,112,399.07	123,012.26	960,755.91	30,873.90	120,769.26
Idaho:						
Boise	15,110.36	2,124,827.77	6,441.71	2,063,509.40	52,649.72	8,668.65
King Hill		60,711.27		59,192.22	1,519.05	
Minidoka	55,764.00	1,866,192.56	61,195.01	1,782,340.99	83,849.62	1.95
Minidoka-Gooding	257.38	757.38	757.38	757.38		
Montana:						
Huntley	17,719.50	554,787.34	19,819.64	543,594.31	11,193.03	
Milk River	40,134.15	171,492.91	40,707.78	163,845.29	1,662.25	5,985.37
Sun River	219.47	159,190.93	219.47	154,891.89	4,117.22	181.82
Montana-North Dakota:						
Lower Yellowstone	36,487.32	326,330.65	40,826.08	326,326.02	4.63	
Nebraska-Wyoming: North Platte	22,329.97	1,839,903.22	38,714.75	1,774,404.56	59,318.20	6,180.46
Nevada: Newlands	14,808.89	1,167,372.02	14,808.89	1,128,692.00	38,680.02	
New Mexico: Carlsbad	56,507.03	815,281.52	42,600.94	767,237.53	16,801.09	31,242.90
New Mexico-Texas: Rio Grande	388,001.07	2,917,283.55	328,390.16	2,688,781.86	161,876.93	66,624.76
North Dakota:						
Buford-Trenton		2,317.41		2,317.41		
Williston		34,042.75		34,042.75		
Oregon: Umatilla	714.17	369,791.44	714.17	365,035.40	4,756.04	
Oregon-California: Klamath	84,680.78	1,115,035.29	87,290.87	1,043,244.22	30,536.22	41,254.85
South Dakota: Belle Fourche	67,500.00	884,808.18	67,500.00	875,432.19	9,375.99	
Utah: Strawberry Valley	54.94	376,875.48	54.94	365,016.81	11,858.67	
Washington:						
Okanogan		371,441.72		368,788.67	2,653.05	
Yakima	271,922.26	4,281,752.18	252,840.47	4,106,063.42	57,962.53	117,726.23
Yakima-Kittitas	39,105.81	39,105.81	39,105.81	39,105.81		
Wyoming: Shoshone	3,205.82	543,989.55	2,824.71	519,787.34	23,707.24	494.97
Total	1,450,150.80	25,445,152.34	1,316,758.17	24,209,729.97	1,732,352.06	503,070.40
Paid in advance of due dates			27,936.33	54,923.87	2,15,556.02	
Penalties and interest	10,257.65	488,359.18	10,256.33	469,109.56	18,900.84	348.78
Refunds				22,335.48	156.69	
Total collections			1,354,950.83	24,756,098.88		

¹ Other credits for fiscal year, \$92,062.85.² Decrease for fiscal year, \$20,875.64.RECLAMATION TABLE 9.—*Accounts receivable, rental of irrigation water*

State and project	Due		Collected			Uncollected June 30, 1931
	Fiscal year 1931	To June 30, 1931	Cash		Other credits to June 30, 1931	
			Fiscal year 1931	To June 30, 1931		
Arizona:						
Salt River		\$2,246,726.01		\$2,246,726.01		
Yuma auxiliary	\$1,497.73	8,720.79	\$1,112.53	7,871.59		\$849.20
Arizona-California: Yuma	12,922.83	509,359.73	12,625.47	495,762.68	\$12,654.19	942.86
California: Orland	85.62	121,437.30	85.62	121,437.30		
Colorado:						
Grand Valley	10,884.60	468,321.26	17,270.60	461,820.59	6,500.67	
Uncompahgre	1,874.76	1,224,007.51	460.63	1,204,111.07	13,217.03	6,679.41
Idaho:						
Boise	16,100.00	765,788.57	16,100.00	761,068.07	4,720.50	
Minidoka	38,842.00	416,748.23	37,314.36	411,957.76	3,290.01	1,500.46
Montana:						
Huntley	267.28	9,853.09	341.98	9,844.59		8.50
Milk River	1,902.79	234,994.65	236.04	225,145.63	1,208.14	8,640.88
Sun River	492.66	132,003.70	802.46	128,581.14	1,366.62	2,055.94

RECLAMATION TABLE 9.—*Accounts receivable, rental of irrigation water—Con.*

State and project	Due		Collected			Uncollected June 30, 1931
	Fiscal year 1931	To June 30, 1931	Cash		Other credits to June 30, 1931	
			Fiscal year 1931	To June 30, 1931		
Montana-North Dakota: Lower Yellowstone	\$3,437.03	\$132,597.75	\$3,493.50	\$132,597.75		
Nebraska-Wyoming: North Platte	3,993.00	337,008.54	3,993.00	336,998.54	\$10.00	
Nevada: Newlands	35.64	28,286.84	35.64	22,109.99	6,176.85	
New Mexico:						
Carlsbad	396.02	38,862.26	365.41	38,813.15		\$49.11
Hondo		9,129.70		9,129.70		
New Mexico-Texas: Rio Grande	33,166.75	1,431,848.81	20,370.20	1,403,344.37		28,504.44
North Dakota:						
Buford-Trenton		31.75		31.75		
Williston		2,117.28		2,117.28		
Oregon:						
Umatilla	7,680.22	88,654.62	7,680.22	62,377.82		26,276.80
Vale	4,167.22	5,816.42	3,587.72	5,236.92		579.50
Oregon-California: Klamath	39,410.10	197,510.08	39,038.75	194,841.45	25.00	2,643.63
South Dakota: Belle Fourche	452.14	8,350.64	452.14	8,332.84	17.80	
Utah: Strawberry Valley		17,596.13		17,596.13		
Washington:						
Okanogan		110,645.28		108,061.09	2,584.19	
Yakima	3,225.31	165,487.05	3,204.21	165,241.95		245.10
Yakima-Kittitas	17,611.50		17,611.50			
Wyoming:						
Riverton	2,406.33	8,631.08	2,018.19	7,795.07	751.31	84.70
Shoshone	6,070.46	55,714.72	6,333.33	55,369.48	137.93	207.31
Total	171,698.99	8,776,249.79	159,310.50	8,644,321.71	2,522,660.24	79,267.84

¹ Contra.² Other credits for fiscal year \$459.39.RECLAMATION TABLE 10.—*Voucher transactions, all funds, and net investment as of June 30, 1931*

Fund	Expenditures		Collections		Net investment	
	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931	Fiscal year 1931	To June 30, 1931
Reclamation fund	\$12,718,335.78	\$258,016,130.43	\$7,409,723.84	\$99,006,719.86	\$5,308,611.94	\$159,009,410.57
Increase of compensation (net)		2,797,960.33				2,797,960.33
Judgments, United States courts	2,806.14	602,814.38			2,806.14	602,814.38
Rio Grande Dam appropriation (net)		1,000,000.00				1,000,000.00
Wind River Indian Riverton (net)		359,176.04				359,176.04
General investigations, Reclamation Service, 1923-24 (net)		266,352.66				266,352.66
Yuma auxiliary	30,215.73	842,864.64	23,922.30	1,000,109.31	6,293.43	¹ 157,244.67
Drainage and cut over (net)		99,815.08				99,815.08
Arid, semiarid, swamp, and cut-over timberlands (net)		35,923.75				35,923.75
Columbia Basin irrigation project (net)		11,634.28				11,634.28
Colorado River Levee system (net)	58,292.37	225,487.28			58,292.37	225,487.28
Air navigation facilities (commerce) (net)	1,813.13	1,813.13			1,813.13	1,813.13
Total	12,811,463.15	264,259,972.00	7,433,646.14	100,006,829.17	5,337,817.01	164,253,142.83

¹ Contra.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion*

[The following tables of data for projects on completion, covering reservoirs, storage dams, diversion dams, and irrigable area, are necessarily subject to some revision as the projects develop and more detailed plans are prepared. In so far as they refer to works yet to be built or areas not yet covered by canals they are not to be taken as guaranteeing that such work will ever be done. All future work depends on appropriations therefor by Congress]

NO. 11. RESERVOIRS

Project	Name	Area	Capacity	Spillway			
				Length	Elevation above stream bed	Capacity	
						Normal	Maximum
Arizona:		<i>Acres</i>	<i>Acre-feet</i>	<i>Feet</i>	<i>Feet</i>	<i>Sec.-ft.</i>	<i>Sec.-ft.</i>
Salt River-----	Roosevelt-----	18,300	1,637,300	378	224	113,000	150,000
Do-----	Mormon Flat-----	1,000	63,200	243	131	-----	150,000
Do-----	Horse Mesa-----	2,600	245,000	243	243	-----	150,000
Do-----	Stewart Mountain-----	1,300	70,000	243	96	-----	150,000
Do-----	Cave Creek flood control.	760	14,000	600	53	20,000	60,000
Arizona-California-Nevada: Boulder Canyon.	Boulder Canyon-----	145,000	30,500,000	700	580	192,000	270,000
California:							
Orland-----	East Park-----	1,850	51,000	415	88	8,000	12,000
Do-----	Stony Gorge-----	1,280	50,200	90	96	30,000	50,000
Colorado: Uncompahgre.	Taylor Park-----	2,260	106,000	(1)	(1)	(1)	(1)
Idaho:							
Boise-----	Deer Flat-----	9,835	177,000	None.	-----	-----	-----
Do-----	Arrowrock-----	2,860	280,000	402	247	15,000	40,000
Do-----	Deadwood-----	3,000	160,000	100	142	5,000	11,500
Minidoka-----	Lake Wolcott-----	11,850	² 150,000	2,385	42	40,000	60,000
Do-----	Jackson Lake-----	25,540	847,000	160	41	7,500	13,000
Do-----	American Falls-----	56,055	1,700,000	540	60	60,000	115,000
Montana:							
Milk River-----	Sherburne Lakes-----	2,000	78,000	160	68	³ 200	8,000
Do-----	Nelson Reservoir-----	4,560	68,500	(1)	⁴ 23	⁵ 0	700
Do-----	Point of Rocks-----	180	830	740	58	³ 300	10,000
Do-----	Chain Lakes-----	9,400	244,000	⁵ 300	62.5	-----	2,000
Sun River-----	Willow Creek-----	1,050	16,700	50	170	-----	50,000
Do-----	Gibson-----	1,360	105,000	314	-----	-----	-----
Do-----	Pishkun-----	1,340	22,000	Under control.	-----	-----	-----
Nebraska-Wyoming:							
North Platte-----	Pathfinder-----	22,700	1,070,000	605	184	40,000	-----
Do-----	Lake Alice-----	900	11,400	100	18	2,500	-----
Do-----	Lake Minatare-----	2,240	60,760	100	55	2,400	-----
Do-----	Winters Creek Lake-----	360	3,000	None.	-----	-----	-----
Do-----	Guernsey-----	2,340	72,700	⁶ 50 ⁷ 128	45 95	-----	50,000 30,000
Nevada:							
Newlands-----	Lake Tahoe-----	124,000	120,000	85	6	2,500	-----
Do-----	Lahontan-----	10,000	⁸ 273,600	500	112	18,800	30,000
New Mexico:							
Carlsbad-----	Avalon-----	970	7,000	1,026	21	86,000	120,000
Do-----	McMillan-----	6,600	45,000	1,750	26.1-24.9	34,500	60,000
New Mexico-Texas:							
Rio Grande-----	Elephant Butte-----	40,080	2,638,000	275	193	8,000	33,000
Oregon:							
Baker-----	Thief Valley-----	750	17,400	268	43	34,400	-----
Umatilla-----	Cold Springs-----	1,500	50,000	330	90	6,000	6,000
Do-----	McKay-----	1,600	75,000	120	140	10,000	10,000
Vale-----	Warm Springs-----	4,400	190,000	324	91	-----	26,000
Oregon-California:							
Klamath-----	Upper Klamath Lake-----	60,000	400,000	None.	-----	-----	-----
Do-----	Clear Lake-----	25,000	462,000	357	24	10,000	30,000
Do-----	Gerber-----	3,800	94,000	150	63	-----	10,000
Oregon-Idaho: Owyhee.	Owyhee-----	12,600	715,000	188.5	312	30,000	40,000
South Dakota: Belle Fourche.	Belle Fourche-----	8,010	203,000	314	100	2,000	2,000
Utah:							
Salt Lake Basin---	Echo-----	1,470	74,000	72	98	-----	15,000
Strawberry Valley---	Strawberry-----	8,370	255,000	58	61	500	2,000

¹ Undetermined.

² 95,180 acre-feet only, available; above fixed crest of spillway.

³ Average flow of stream on which reservoir is located.

⁴ No spillway; drainage limited; elevation is that of water surface.

⁵ Consists of 8 siphons each 5 feet high and 10 feet wide at throat.

⁶ One 50 by 50 Stony gate; gate sill 45 feet above river bed.

⁷ Two 64 by 14½-foot drum gates; top elevation 95 feet above river bed.

⁸ At spillway level; proposed to increase to 290,000 by adding 2 feet by movable crest.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion—*
Continued

NO. 11. RESERVOIRS—Continued

Project	Name	Area	Capacity	Spillway			
				Length	Elevation above stream bed	Capacity	
						Normal	Maximum
Washington:		<i>Acres</i>	<i>Acre-feet</i>	<i>Feet</i>	<i>Feet</i>	<i>Sec.-ft.</i>	<i>Sec.-ft.</i>
Okanogan.....	Salmon Lake.....	240	10,500	Siphon.	48	-----	400
Do.....	Conconully.....	460	14,400	180	58	4,500	16,000
Yakima.....	Bumping Lake.....	1,300	34,000	235	36	-----	6,000
Do.....	Lake Cle Elum.....	4,890	435,000	185	108	-----	40,000
Do.....	Lake Kachess.....	4,540	210,000	250	53	-----	7,200
Do.....	Tieton.....	2,500	202,500	390	206	-----	50,000
Do.....	Lake Keechelus.....	2,550	152,000	300	60	-----	10,000
Do.....	Clear Lake.....	270	5,830	261	58	-----	-----
Wyoming:							
Riverton.....	Pilot Butte.....	880	30,000	100	-----	-----	500
Do.....	Bull Lake.....	3,100	145,000	170	67	4,000	8,000
Shoshone.....	Shoshone.....	6,600	456,600	300	233	11,000	30,000
Do.....	Ralston.....	200	2,100	-----	-----	-----	-----
Do.....	Deaver.....	80	680	None.	-----	-----	-----
Total.....		668,680	45,220,200	-----	-----	-----	-----

NO. 12. STORAGE DAMS (COMPLETED UNLESS OTHERWISE NOTED)

Project	Name	Type	Maximum height	Crest length	Volume
Arizona:			<i>Feet</i>	<i>Feet</i>	<i>Cu. yds.</i>
Salt River.....	Roosevelt.....	Rubble masonry arch, gravity.	284	1,125	342,970
Do.....	Mormon Flat.....	Concrete, variable radius arch.	229	623	42,980
Do.....	Horse Mesa.....	do.....	305	784	147,360
Do.....	Stewart Mountain.....	Variable radius arch.....	212	1,260	122,000
Do.....	Cave Creek flood con- trol.	Reinforced-concrete mul- tiple arch.	109	1,680	18,770
Arizona-California-Nev- ada: Boulder Can- yon.	Hoover ¹⁰	Concrete arch, gravity.....	727	1,180	3,400,000
California:					
Orland.....	East Park.....	do.....	139	250	12,200
Do.....	Stony Gorge.....	Ambursen, reinforced con- crete.	142.5	868	43,140
Colorado: Uncompah- gre.	Taylor Park ¹¹	Undetermined.....	(11)	(11)	(11)
Idaho:					
Boise.....	Upper Deer Flat.....	Earth fill.....	70	4,000	1,190,280
Do.....	Lower Deer Flat.....	do.....	40	7,200	1,207,610
Do.....	Deer Flat Forest.....	do.....	16	950	22,500
Do.....	Arrowrock.....	Rubble concrete arch, gravity.	349	1,100	585,130
Do.....	Deadwood.....	Concrete arch.....	160	700	50,000
Minidoka.....	Minidoka.....	Rock fill, concrete core.....	86	937	242,500
Do.....	Jackson Lake.....	Massive concrete gate sec- tion and earth fill.	67	4,450	345,400
Do.....	American Falls.....	{ Concrete gravity and earth embankment. }	87	{ 3,096 2,162 }	{ 170,000 150,000 }
Montana:					
Milk River.....	Sherburne Lakes ¹²	Earth fill.....	87	1,133	201,500
Do.....	Nelson.....	do.....	28	9,900	175,000
Do.....	Point of Rocks.....	do.....	12.5	900	31,000
Do.....	Connolly ¹¹	do.....	68	3,125	2,019,000
Sun River.....	Willow Creek.....	do.....	72.5	525	196,400
Do.....	Gibson.....	Concrete arch.....	205	882	160,000
Do.....	Pishkun.....	Earth fill.....	45	5,070	368,470

¹⁰ Under construction.¹¹ Not designed.¹² Completed except permanent spillway.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion—*
Continued

NO. 12. STORAGE DAMS (COMPLETED UNLESS OTHERWISE NOTED)—Continued

Project	Name	Type	Maximum height	Crest length	Volume
Nebraska-Wyoming: North Platte	Pathfinder	Broken range masonry arch.	<i>Feet</i> 218	<i>Feet</i> 432	<i>Cu. yds.</i> 60, 210
Do	Pathfinder Dike	Earth fill	38	1, 650	152, 250
Do	Upper Lake Alice	do	30	3, 100	240, 000
Do	Lower Lake Alice	do	23	2, 550	119, 000
Do	Minatare	do	65	3, 700	570, 000
Do	Guernsey	Sand, gravel, and rock fill.	105	560	561, 260
Nevada: Newlands	Lake Tahoe	Concrete sluiceway regulator.	14	109	430
Do	Lahontan	Earth and gravel fill with concrete spillways.	124	1, 400	770, 000
New Mexico: Carlsbad	Avalon	Earth and rock fill, concrete core.	50	1, 380	168, 770
Do	McMillan	Earth and rock fill.	55	2, 070	150, 740
New Mexico-Texas: Rio Grande	Elephant Butte	Rubble concrete, gravity.	306	¹³ 1, 155	¹⁴ 605, 200
Do	Elephant Butte Dike	Earth and rock fill.	¹⁵ 42	2, 000	¹⁵ 179, 000
Oregon: Baker	Thief Valley	Ambursen, reinforced concrete.	66	380	4, 780
Umatilla	Cold Springs	Earth and rock fill.	98	3, 800	789, 500
Do	McKay	Gravel fill with concrete paving.	160	2, 600	2, 313, 000
Vale.	Warm Springs	Concrete arch.	109	324	19, 460
Oregon-California: Klamath	Clear Lake	Rock fill.	33	790	56, 600
Do	Link River	Concrete.	22	435	2, 200
Do	Gerber	Concrete arch.	85	478	11, 900
Oregon-Idaho: Owyhee	Owyhee ¹⁰	Concrete arch, gravity.	405	835	525, 000
South Dakota: Belle Fourche.	Belle Fourche	Earth fill.	122	6, 200	1, 600, 000
Utah: Salt Lake Basin	Echo	Earth and rock fill.	125	1, 800	1, 676, 000
Strawberry Valley	Indian Creek Dike	Earth fill, reinforced concrete core wall.	38	1, 311	101, 170
Do	Strawberry	do	72	488	108, 420
Washington: Okanogan	Salmon Lake	Earth embankment.	40	1, 260	194, 290
Do	Conconully	Hydraulic earth fill.	67	1, 000	352, 240
Yakima	Bumping Lake	Earth fill.	45	3, 425	247, 700
Do	Cle Elum ¹⁶	Rolled earth and gravel fill.	135	770	1, 254, 750
Do	Kachess	do	63	1, 400	193, 300
Do	Tieton	Earth and rock fill, concrete core wall.	222	905	1, 995, 000
Do	Keechelus	Rolled earth and gravel fill.	70	6, 500	639, 000
Do	Clear Creek	Single concrete arch, gravity abutments.	84	404	4, 100
Wyoming: Riverton	Pilot Butte No. 1	Earth embankment.	40	1, 350	133, 900
Do	Pilot Butte No. 2	do	24	1, 150	50, 500
Do	Pilot Butte No. 3	do	12	3, 400	19, 200
Do	Bull Lake	do	75	3, 300	600, 000
Shoshone	Shoshone	Rubble-concrete arch.	328	200	78, 580
Do	Ralston	Earth fill.	50	2, 200	24, 740
Do	Deaver	do	14	1, 300	30, 300
Total					27,846, 700

¹⁰ Under construction.¹³ Including spillway and approaches, 1,675 feet.¹⁴ Including spillway, 618,536 cubic yards.¹⁵ Concrete pavement, 5,934 cubic yards.¹⁶ Present development, rock-fill timber crib; height, 11 feet; volume 1,500 cubic yards.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion—*
Continued

NO. 13. DIVERSION DAMS (COMPLETED UNLESS OTHERWISE NOTED)

Project	Name	Type	Maximum height	Crest length	Volume
Arizona:			<i>Feet</i>	<i>Feet</i>	<i>Cu. yds.</i>
Salt River.....	Granite Reef.....	Rubble-concrete weir.....	38	1,000	40,000
Do.....	Power canal.....	do.....	12.75	400	8,000
Do.....	Joint head.....	Concrete weir.....	10	600	1,740
Arizona - California:					
Yuma.....	Laguna.....	Indian weir, concrete and rock fill.	19 ⁹	4,780	476,030
Arizona-California-Nevada: Boulder Canyon.	Imperial ¹¹	do.....	30	1,770	-----
California:					
Orland.....	South Canal.....	Concrete on piling, with rock fill.	20	900	2,890
Do.....	North side.....	Concrete weir, with removable crest.	8	360	270
Do.....	East Park Feed Canal..	Concrete arch.....	44	154	1,780
Colorado:					
Grand Valley.....	Colorado River.....	Concrete weir with rolling steel crest.	24	546	25,680
Uncompahgre.....	Gunnison.....	Crib with rock fill and movable flashboards.	15.75	237	3,200
Do.....	Montrose and Delta.....	Timber weir with concrete apron sluiceway and cut-off wall	6.8	68.5	170
Do.....	Loutsenhizer.....	Pile and timber weir.....	8	100	-----
Do.....	Selig.....	Pile and timber weir with concrete sump.	6	95.5	200
Do.....	Ironston.....	Pile foundation with timber deck and needle flashboards.	8.5	58.5	-----
Do.....	East Canal.....	Pile and timber weirs, movable flashboards.	(17)	144	-----
Do.....	Garnet.....	Rock baskets, faced and surfaced with concrete.	6.5	75	500
Idaho:					
Boise.....	Boise River.....	Rubble-concrete weir.....	45	246	21,750
Do.....	Black Canyon.....	Concrete masonry.....	183	1,040	79,840
Minidoka.....	Minidoka.....	Combined diversion and storage dam (see Storage).	-----	-----	-----
Montana:					
Milk River.....	Swift current.....	Earth and rock-fill timber crib.	13	2,800	86,700
Do.....	St. Mary.....	Concrete.....	6.5	198	480
Do.....	Chinook ¹⁹	Timber crib, rock filled, concrete abutment, movable crest.	25	319	12,000
Do.....	Dodson.....	Hollow reinforced concrete, automatic movable crest.	34	1,500	11,000
Do.....	Vandalia.....	Concrete arch.....	132	212	6,200
Sun River.....	Sun River.....	Rock-filled timber weir.....	12	700	14,500
Montana - North Dakota: Lower Yellowstone.	Lower Yellowstone.....				
Nebraska-Wyoming:					
North Platte.....	Whalen.....	Concrete weir with earth abutments.	35	300	144,860
Do.....	Horse Creek.....	do.....	6	118	4,960
Nevada:					
Newlands.....	Truckee River.....	16 concrete sluiceways.....	22	171	3,320
Do.....	Carson River.....	23 concrete sluiceways.....	20	240	2,710
New Mexico: Carlsbad.	Avalon.....	Combined storage and diversion (see Storage).	-----	-----	-----
New Mexico-Texas:					
Rio Grande.....	Percha.....	Rubble-concrete weir.....	17	350	4,350
Do.....	Leasburg.....	Rubble-concrete weir on piling.	10.8	600	2,640
Do.....	Mesilla.....	13 radial gates and concrete bridge.	16.7	303	2,880
Do.....	Mexican ²⁰	Rubble masonry.....	4.7	320	1,200
Do.....	Riverside.....	6 radial gates, concrete piers.	10	106	2,110

⁹ Maximum height: 40 feet from bottom of sheet piling to top of dam; water raised 10 feet.¹¹ Not designed.¹⁷ 2 weirs, one 6 by 72 feet, the other 6 feet 10 inches by 72 feet.¹⁹ Constructed by irrigation districts. No data available as to type and dimensions.²⁰ Constructed by Mexican authorities and used jointly.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion—*
Continued

NO. 13. DIVERSION DAMS (COMPLETED UNLESS OTHERWISE NOTED)—Continued

Project	Name	Type	Maximum height	Crest length	Volume
Oregon:			<i>Feet</i>	<i>Feet</i>	<i>Cu. yds.</i>
Umatilla.....	Feed canal (Echo).....	Concrete weir on timber crib.	2.5	400	300
Do.....	Maxwell Canal.....	do.	2.3	175	40
Do.....	Three-Mile Falls.....	Concrete multiple arch.	24	800	4,160
Vale.....	Harper.....	{ Concrete gravity with earth and rock-filled embankment. }	30	700	{ 1,570 8,000 }
Oregon-California:					
Klamath.....	Lost River.....	Hollow reinforced concrete.	40	290	5,550
Do.....	Lower Lost River.....	Reinforced concrete.	15	204	630
Do.....	Malone.....	Earth with concrete spillway.	30	515	18,500
Do.....	Miller.....	do.	12	290	1,000
South Dakota: Belle Fourche.	Diversion.....	Concrete weir.....	23	400	12,150
Utah:					
Salt Lake Basin.	Weber-Provo.....	Concrete weir and dike..	20	150	21,890
Strawberry Valley..	Spanish Fork.....	Reinforced concrete, ogee gravity section.	17	70	1,260
Do.....	Indian Creek Crossing..	Earth fill with clay-filled cut-off trench.	17	1,300	15,180
Washington:					
Okanogan.....	Salmon Creek.....	Concrete weir.....	4	50	30
Yakima.....	Sunnyside.....	Concrete ogee weir and earth dike.	8.5	500	2,290
Do.....	Tieton diversion.....	Concrete weir and rock-filled crib.	3	110	330
Do.....	Easton.....	Concrete gravity, with ogee river section.	60	248	5,700
Wyoming:					
Riverton.....	Wind River.....	Concrete weir with earth embankment.	37	2,285	123,850
Shoshone.....	Corbett.....	Reinforced-concrete weir..	18	400	4,950
Do.....	Willwood.....	Concrete gravity, with ogee weir section.	69.5	320	22,120
Total.....					1,211,560

No. 14. AREA POSSIBLY SUSCEPTIBLE OF IRRIGATION

	Public land			State land unsold	Indian land	Private land		Total
	Entered	Open	With-drawn			Rail-road unsold	Other	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Arizona: Salt River.....							252,509	252,509
Arizona-California:								
Yuma.....	13,758	4,243	34,985		7,853		50,895	111,734
Arizona—								
Valley.....	6,037		2,307		110		43,859	52,313
Mesa.....	1,836	4,243	32,124				6,797	45,000
California-Reservation.	5,885		554		7,743		239	14,421
California: Orland-Main.							21 20,704	21 20,704
Colorado:								
Grand Valley.....	13,434		7,872				29,187	50,493
Garfield Gravity.....	11,434		4,372				16,187	31,993
Garfield Pumping.....	2,000		3,500				3,000	8,500
Orchard Mesa Pumping.							10,000	10,000
Uncompahgre.....	12,874	1,939					60,841	75,654
Idaho:								
Boise.....	69,468		17,320	6,850			251,860	345,496
Arrowrock (Idaho).....	65,892			60			203,869	269,821
Arrowrock (Oregon).....	1,206						5,697	6,903
Notus.....							6,874	6,874
Hillcrest.....	1,000		2,000	1,000			10,100	14,100
Black Canyon.....	1,370		15,320	5,790			25,320	47,800

* Includes 416 acres of vested rights and 170 acres of school and town sites.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion—*
Continued

No. 14. AREA POSSIBLY SUSCEPTIBLE OF IRRIGATION—Continued

	Public land			State land unsold	Indian land	Private land		Total
	Entered	Open	With-drawn			Rail-road unsold	Other	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
King Hill.....				335			16,553	16,888
Minidoka.....	92,292		148,788	9,492			63,016	313,588
South Side pumping.....	30,258			982			17,680	48,920
North Side gravity.....	62,034		1,948	670			5,336	69,988
North Side pumping.....			106,840	7,840				114,680
Gooding.....			40,000				40,000	80,000
Montana:								
Huntley.....	26,213		2,553		244		3,497	32,507
Gravity.....	21,272		2,007		244		3,497	27,020
Pumping.....	4,941		546					5,487
Divisions—								
Pryor.....	23,549		1,889		66		2,912	28,416
Eastern.....	925		42		178		585	1,730
Fly Creek.....	1,739		622					2,361
Milk River.....	28,940		14,425	5,541			94,382	143,288
Chinook.....	1,941		1,608	1,198			50,753	55,500
Malta.....	21,273		12,365	3,280			28,737	65,655
Glasgow.....	5,726		452	1,063			14,892	22,133
Sun River.....	38,113	5,959	28,596	4,108			30,066	106,842
Sun River Slope.....	655		13,341	969			3,213	18,178
Big Coulee.....				356			1,934	2,290
Greenfields.....	22,071	5,959	12,809	2,566			21,258	64,663
Mill Coulee.....	4,197		1,543				2,160	7,900
Fort Shaw.....	11,190		903	217			1,501	13,811
Montana-North Dakota:								
Lower Yellowstone.....	10,922		1,735	611		39	45,014	58,321
Montana.....	5,508		976	471		39	31,006	38,000
North Dakota.....	5,414		759	140			14,008	20,321
Divisions—								
Gravity.....	10,854		1,735	406		39	42,979	56,013
Pumping.....	68			205			2,035	2,308
Nebraska-Wyoming:								
North Platte.....	51,430		2,526	3,508			178,198	235,662
Interstate division.....	10,481		1,257	723			100,456	112,917
Nebraska.....	9,738		1,128	723			98,522	110,111
Wyoming.....	743		129				1,934	2,806
Fort Laramie division.....	33,711		1,152	2,746			68,966	106,575
Nebraska.....	13,512			246			41,273	55,031
Wyoming.....	20,199		1,152	2,500			27,693	51,544
Northport division.....	7,238		117	39			8,776	16,170
Nebraska.....	7,238		117	39			8,776	16,170
Nevada:								
Newlands.....	29,308	554	17,512		4,877	7,500	30,249	90,000
Carson.....	25,827	433	12,114		4,877	2,500	27,249	73,000
Truckee.....	3,481	121	5,398			5,000	3,000	17,000
New Mexico: Carlsbad.....	45						25,010	25,055
New Mexico-Texas:								
Rio Grande.....	550			200			154,250	155,000
New Mexico.....	550			200			87,250	88,000
Texas.....							67,000	67,000
Divisions—								
Rincon.....				50			16,950	17,000
Leasburg.....	300			100			30,600	31,000
Mesilla.....	250			50			49,700	50,000
El Paso.....							57,000	57,000
Oregon:								
Umatilla.....							17,570	17,570
East division.....							10,940	10,940
West division.....							6,630	6,630
Vale.....	3,048	201	1,071				24,030	28,350
Oregon-California:								
Klamath.....	17,917		17,360				138,527	173,804
Oregon.....	3,951						100,941	104,892
California.....	13,966		17,360				37,586	68,912
Divisions—								
Main.....	2,513						38,863	41,376
Tule Lake.....	15,404		17,360				236	33,000
Pumping.....							20,595	20,595
Langell Valley.....							18,933	18,933
Bonanza Springs.....							5,900	5,900
Lower Klamath Lake.....							54,000	54,000

* Includes some public land, but distribution not known.

RECLAMATION TABLES 11-14.—*Engineering data for projects on completion—*
Continued

No. 14. AREA POSSIBLY SUSCEPTIBLE OF IRRIGATION—Continued

	Public land			State land unsold	Indian land	Private land		Total
	Entered	Open	Withdrawn			Railroad unsold	Other	
Oregon-Idaho:	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Owyhee.....	10,000	-----	19,000	1,000	-----	-----	93,000	123,000
Idaho, complete supply.....	4,000	-----	6,000	-----	-----	-----	28,000	38,000
Oregon—								
Complete supply.....	6,000	-----	13,000	1,000	-----	-----	53,000	73,000
Supplemental right.....							12,000	12,000
South Dakota: Belle Fourche.....	33,683	99	5,111	2,580	-----	-----	39,300	80,773
Utah:								
Strawberry Valley.....	2,003	-----	-----	-----	-----	-----	51,886	53,889
High Line.....	2,003	-----	-----	-----	-----	-----	19,853	21,856
Spanish Fork.....							22,033	22,033
Springville-Mapleton.....							10,000	10,000
Salt Lake Basin.....							77,000	77,000
Washington:								
Okanogan.....	116	-----	-----	-----	-----	-----	7,184	7,300
Gravity.....	116	-----	-----	-----	-----	-----	6,009	6,125
Pumping.....							1,175	1,175
Yakima.....	7,035	-----	14,098	6,089	241	18,339	294,160	339,962
Sunnyside.....	2,627	-----	-----	30	241	-----	104,702	107,600
Tieton.....	1,725	-----	-----	-----	-----	-----	28,537	30,262
Kittitas.....			5,400	1,560	-----	546	64,494	72,000
Roza.....	120	-----	1,523	2,067	-----	11,310	43,330	58,350
Moxee.....	1,663	-----	775	1,332	-----	2,783	30,197	36,750
Kennewick.....	900	-----	6,400	1,100	-----	3,700	22,900	35,000
Wyoming:								
Riverton.....	1,386	6,597	61,017	-----	1,000	-----	30,000	100,000
Shoshone.....	56,309	6,078	115,842	3,907	-----	7,017	13,986	203,139
Montana, Frannie division.....			86	4	-----	-----	-----	90
Wyoming—								
Garland division.....	37,429	212	1,806	252	-----	-----	2,362	42,061
Frannie division.....	14,252	395	11,129	315	-----	346	1,473	27,910
Willwood division.....	4,410	5,471	1,389	305	-----	-----	329	11,904
Heart Mountain division.....								
Oregon Basin division.....	218	-----	48,845	1,958	-----	6,671	9,822	67,514
			52,587	1,073	-----	-----	-----	53,660
Total.....	518,844	25,670	509,811	44,221	14,215	32,895	2,092,874	3,238,530

RECLAMATION TABLE 15.—*Summary of construction results to June 30, 1931*

Items	To June 30, 1931	To June 30, 1930	Increase
Reservoir capacity available (original).....	<i>Acre-feet</i> 13,204,528	<i>Acre-feet</i> 12,970,528	<i>Acre-feet</i> 234,000
CANALS, DITCHES, AND DRAINS	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>
Canals over 800 second-feet capacity.....	680.9	593.8	87.1
Canals 301 to 800 second-feet capacity.....	753.7	744.6	9.1
Canals 50 to 300 second-feet capacity.....	2,356.5	2,334.8	21.7
Canals less than 50 second-feet capacity.....	9,802.5	9,605.1	197.4
Total canals.....	13,593.6	13,278.3	315.3
Waste-water ditches.....	1,099.7	1,096.5	3.2
Drains, open.....	2,533.0	2,378.3	154.7
Drains, closed.....	240.3	237.0	3.3
Total.....	3,873.0	3,711.8	161.2
Grand total.....	17,466.6	16,990.1	476.5
TUNNELS			
Number.....	132	124	8
Length (feet).....	210,417	176,700	33,717

RECLAMATION TABLE 15.—*Summary of construction results to June 30, 1931—*
Continued

Items	To June 30, 1931		To June 30, 1930		Increase	
STORAGE AND DIVERSION DAMS						
Masonry.....	Cubic yards 3,347,863		Cubic yards 2,951,239		Cubic yards 396,624	
Earth.....	17,041,342		17,041,342		0	
Rock fill and crib.....	2,299,091		2,219,948		79,143	
Total.....	22,688,296		22,212,529		475,767	
DIKES AND LEVEES						
Length and volume.....	Feet 1,348,093	Cu. yds. 7,506,191	Feet 1,312,801	Cu. yds. 7,205,359	Feet 35,292	Cu. yds. 300,832
	Concrete	Wood	Concrete	Wood	Concrete	Wood
CANAL STRUCTURES						
Costing over \$2,000.....	Number 1,698	Number 270	Number 1,655	Number 255	Number 43	Number 15
Costing \$500 to \$2,000.....	3,916	1,198	3,730	1,145	186	53
Costing \$100 to \$500.....	21,319	12,000	20,017	11,608	1,302	392
Costing less than \$100.....	35,862	89,164	34,717	88,342	1,145	822
Total.....	62,795	102,632	60,119	101,350	2,676	1,282
Grand total.....	165,427		161,469		3,958	
BRIDGES						
	Number	Length	Number	Length	Number	Length
Steel.....	113	9,175	112	9,124	1	51
Combination.....	485	15,172	441	13,371	44	1,801
Wood.....	11,164	265,824	10,880	254,272	284	11,552
Concrete.....	432	5,842	431	5,832	1	10
Total.....	12,194	296,013	11,864	282,599	330	13,414
CULVERTS						
Concrete.....	4,552	249,950	3,953	209,747	599	40,203
Metal.....	4,534	176,965	4,070	154,009	464	22,956
Terra cotta.....	2,158	86,420	2,135	84,836	23	1,584
Wood.....	4,543	127,736	4,517	119,215	26	8,521
Total.....	15,787	641,071	14,675	567,807	1,112	73,264
PIPE						
	Linear feet		Linear feet		Linear feet	
Concrete.....	1,230,993		1,173,007		57,986	
Metal.....	576,263		497,109		79,154	
Terra cotta (tile).....	1,919,854		1,899,291		20,563	
Wood.....	709,842		709,842		0	
Total.....	4,436,952		4,279,249		157,703	
FLUMES						
	Number	Length	Number	Length	Number	Length
Concrete.....	127	78,046	125	77,870	2	176
Metal.....	2,334	248,595	2,224	244,700	110	3,895
Wood.....	3,079	551,999	2,911	542,734	168	9,265
Total.....	5,540	878,640	5,260	865,304	280	13,336
	Concrete	Wood	Concrete	Wood	Concrete	Wood
CANALS LINED						
Length (miles).....	495.1	4.2	489.0	4.1	6.1	0.1
Total.....	499.3		493.1		6.2	
BUILDINGS						
	Number		Number		Number	
Offices.....	108		107		1	
Residences.....	747		747		0	
Power plants.....	37		37		0	
Pumping stations.....	301		296		5	
Barns, storehouses, etc.....	579		579		0	
Total.....	1,772		1,766		6	

RECLAMATION TABLE 15.—*Summary of construction results to June 30, 1931—Continued*

Items	To June 30, 1931		To June 30, 1930		Increase	
	Concrete	Wood	Concrete	Wood	Concrete	Wood
WELLS						
Number and depth (feet) -----	<i>Number</i> 747	<i>Depth</i> 85,067	<i>Number</i> 747	<i>Depth</i> 85,067	<i>Number</i> 0	<i>Depth</i> 0
COMMUNICATIONS						
	<i>Miles</i>		<i>Miles</i>		<i>Miles</i>	
Roads -----	1,461.4		1,346.7		114.7	
Railroads -----	117.3		116.2		1.1	
Telephone lines -----	4,010.6		4,010.6		0.0	
Transmission lines -----	3,225.7		3,204.7		21.0	
Total -----	8,815.0		8,678.2		136.8	
POWER DEVELOPED						
Water and steam, horsepower -----	189,934		189,348		586	
EXCAVATION						
	<i>Cubic yards</i>		<i>Cubic yards</i>		<i>Cubic yards</i>	
Class 1, earth -----	270,511,459		261,353,745		9,157,714	
Class 2, indurated material -----	18,265,716		17,186,605		1,079,111	
Class 3, rock -----	15,019,997		13,565,509		1,454,488	
Total -----	303,797,172		292,105,859		11,691,313	
Riprap (cubic yards) -----	2,570,254		2,565,250		5,004	
Paving (square yards) -----	1,974,756		1,968,869		5,887	
Concrete (cubic yards) -----	4,776,359		4,391,996		384,363	
Cement (barrels) -----	5,350,393		4,925,932		424,461	
Guniting (square yards) -----	912,096		909,096		3,000	

RECLAMATION TABLE 16.—Power plants operated on Bureau of Reclamation projects during fiscal year 1930-31

Project	Name of plant	Outgoing line voltage	Plant capacity kilowatt-amperes	Number of units	Head in feet	First cost of plant and maintenance	Cost of operation and maintenance	Estimated depreciation	Cost per kilowatt-hour exclusive of depreciation	Distribution of kilowatt-hours generated			Total output kilowatt-hour	Gross power sales
										Sold to consumers	Irrigation and drainage requirements	Used for other purposes		
Boise	Black Canyon 1	10 66,000	10,000	2	82-92	\$414,317.21	\$14,394.23	\$15,291.00	\$0.00034	Entire output delivered to Idaho Power Co.			42,119,956	\$105,199.02
	Boise River 2	22,000	1,875	3	25-30	167,905.37	8,007.73	6,141.00	.0027	22,868,580/29,861,335/6,881,692	223,007	517,073	2,958,544	6,100.00
	Minidoka	33,000	10,000	6	47-02	645,921.03	22,612.00	24,396.00	.00036				4,637,765	177,888.98
Minidoka	American Falls (2 plants) 4	33,000	1,540	3	36.45	\$76,975.00								
	Newlands 5	33,000	1,875	3	105-110	141,886.01	7,340.07	4,260.00		5,131,620			5,871,700	21,616.67
North Platte	Guernsey	33,000	6,000	2	70-90	454,214.27	13,630.77	10,500.00	.00074	24,408,568	48,930	232,919	18,409,000	264,320.56
	Lingle	33,000	1,750	4	106	184,791.74	14,879.23	4,680.00	.001623				9,165,470	
Rio Grande	Elephant Butte	2,300	150	1	18-180	8,440.50	2,187.27	None.	.034	None.	None.	64,650	64,650	None.
	Pilot Butte	33,000	2,000	2	103	218,962.14	27,103.04	11,091.80	.01668				1,624,890	
Salt River	Horse Mesa	110,000	33,300	3	265	754,885.13	26,266.07	37,744.25	.00033	1,113,158	None.	293,272	80,390,000	21,204.91
	Roosevelt	110,000	19,250	7	70-240	1,235,894.58	74,655.54	61,794.73	.00212				35,178,000	
Stewart	Stewart Mountain	45,000	13,000	1	35-114	320,371.98	17,619.61	16,018.60	.00054	919,672/6,122/57,302,239	234,779	40,201,161	43,657,000	2,686,301.72
	Mormon Flat	110,000	8,750	1	40-150	482,767.80	12,797.87	24,138.39	.00027				3,365,700	
Shoshone	Crosscut	40,000	5,250	6	111	755,147.29	23,324.21	37,757.36	.00281	5,367,863	None.	128,950	5,478,600	76,118.97
	So. Consolidated	40,000	2,000	2	34	163,139.60	11,325.64	8,156.98	.00207				2,681,075	
Strawberry Valley	Arizona Falls	11,000	1,060	2	19	109,500.73	8,742.27	5,475.04	.00326	5,367,863	None.	192,310	1,745,920	40,355.46
	Chandler	11,000	600	1	40	91,990.84	7,831.51	4,599.54	.00349				6,139,534	
Yakima-Sun-ny-side	Shoshone	33,000	1,600	2	225	567,698.96	11,750.00	23,383.44	.00191	None.	688,500	None.	668,500	60,661.70
	Spanish Fork	11,000	1,000	2	123.5	60,904.80	20,008.77	3,045.24	.011				2,263,870	
Yuma	Rocky Ford	6,600	187	1	73	23,000.00	2,253.15	1,056.40	.003	5,904,043	1,336,365	400,271	4,741,757	
	Siphon Drop	33,000	2,000	2	9.28	317,936.03	16,700.00	13,248.00	.002157					

1 Operated entire fiscal year.

2 Amount for June, 1931, estimated.

3 Plant operated during July, August, and September, 1930, and during May and June, 1931. Held for stand-by service balance of the year.

4 Includes purchased power.

5 West Side plant operated only in case of emergency, not operated since 1927. Island plant partially dismantled, first cost included.

6 Estimated.

7 Operated by irrigation district or water users' association.

8 Operated by Sierra Pacific Power Co. under lease assigned by Canyon Power Co.

9 All eight power plants feed into the same distribution system.

10 6,600-volt generators. All others 2,300 volts except as noted.

11 11,000-volt generators.

RECLAMATION TABLE 17.—Principal contracts for sale of power in force June 30, 1931

Project	Contractor	Date of contract	Date of expiration	Reserved power (kilowatts)	Gross rate per kilowatt-hour (cents)	Minimum monthly payment	Gross income fiscal year 1930-31	Remarks
		Oct. 18, 1924	Oct. 18, 1934	1,000		Rental basis leased for standby service		
Boise	Gem Irrigation District	Oct. 10, 1930	Apr. 15, 1936	1,000	4	\$2,100.00	\$64,198.47	{Served through Idaho Power Co., from Black Canyon power plant, covers Boise River power plant.
	Idaho Power Co.	Apr. 11, 1931	Apr. 11, 1936	2,100	4	900.00	36,104.60	
	Ontario-Nyssa Irrigation District	Jan. 1, 1930	Jan. 1, 1940	1,300	4	416.67	7,099.85	
Mimidoka	City of Rupert, Idaho	do	do	1,350	4	103.68	6,603.58	
	Paul Electric Co.	Feb. 4, 1924	Mar. 31, 1934	280	4	70.20	4,098.39	
	Village of Albion, Idaho	Jan. 1, 1931	Jan. 1, 1936	30	4	59.04	3,203.42	
	Unity Light & Power Co.	Mar. 11, 1927	Mar. 1, 1932	41	4	37.15	2,231.14	
	Village of Declo	Oct. 1, 1930	Oct. 1, 1933	74	4	31.68	1,970.00	
	Rural Electric Co.	Apr. 1, 1928	Apr. 1, 1932	20	4	60.00	1,837.71	
	East End Mutual Electric Co.	Feb. 1, 1928	Feb. 1, 1933	80	4	150.00	1,819.49	
	Village of Heyburn, Idaho	Jan. 1, 1930	Jan. 1, 1934	30	4	31.68	1,749.32	
	Village of Mimidoka, Idaho	Feb. 5, 1924	Apr. 1, 1933	20	4	24.30	1,442.89	
	Declo Light & Power Co.	May 1, 1928	May 1, 1933	15	4	39.70	1,346.58	
	Ferry Light & Power Co.	Mar. 1, 1929	Mar. 1, 1934	19	4	30.10	1,144.24	
	Armagu Mutual Sugar Co.	May 1, 1931	May 1, 1935	39	4	24.30	1,001.98	
	West End Power Co.	Dec. 1, 1930	Dec. 1, 1935	15	4	24.30	1,210.24	
	Riverside Electric Co.	Jan. 1, 1931	Jan. 1, 1933	212	4	1,200.00	21,616.67	
	40 small contracts.	Feb. 1, 1928	Various.	1,500	.3			
Newlands	Sierra Pacific Power Co.	Jan. 29, 1923	Nov. 30, 1934		.4			
	Western Public Service Co.	Oct. 29, 1927	Oct. 29, 1937	400	8	2,400.00	61,930.48	Contract assigned by Canyon Power Co. to Sierra Pacific Power Co.
North Platte	Mt. States Power Co., Casper, Wyo.	May 23, 1927	May 25, 1937	800	8	3,600.00	54,155.23	
	Town of Wheatland, Wyo.	May 3, 1928	June 30, 1938	500	8	800.00	25,816.55	
	Colorado Fuel & Iron Co.	May 18, 1925	Jan. 1, 1941	1,200	8	1,800.00	25,546.98	
	Town of Torrington, Wyo.	Apr. 3, 1928	June 30, 1938	400	8	800.00	22,678.19	
	City of Gering, Nebr.	Apr. 17, 1928	do	250	8	800.00	17,831.83	
	City of Mitchell, Nebr.	Apr. 30, 1928	do	250	8	800.00	16,137.66	
	Village of Morrill, Nebr.	Apr. 30, 1928	do	150	8	300.00	9,226.77	
	Village of Lyman, Nebr.	May 1, 1928	do	250	8	250.00	8,762.48	
	Town of Guernsey, Wyo.	Apr. 10, 1928	do	250	8	450.00	7,117.92	
	Town of Lingle, Wyo.	May 17, 1928	do	150	8	175.00	3,042.49	
	Mountain States Power Co., Yoder, Wyo.	Apr. 30, 1928	do	75	8	75.00	2,585.19	
	Town of Fort Laramie, Wyo.	July 15, 1929	Dec. 31, 1934	25	8			
	Dutch Flats Elect. Co., Morrill, Nebr.	May 7, 1928	June 30, 1938	25	8	50.00	1,513.19	
	Holly Sugar Corp., Torrington, Wyo.	Aug. 10, 1928	June 1, 1931	25	8	75.00	1,484.29	
		Aug. 27, 1928	Mar. 1, 1933	1,000	1.5		1,335.00	

2 Minimum payment guaranteed on annual basis.

1 April to September, inclusive.

RECLAMATION TABLE 17.—Principal contracts for sale of power in force June 30, 1931—Continued

Project	Contractor	Date of contract	Date of expiration	Reserved power (kilowatts)	Gross rate per kilowatt-hour (cents)	Minimum monthly payment	Gross income fiscal year 1930-31	Remarks
North Platte	Western Pub. Serv. Co., Huntley, Wyo.	Dec. 1, 1930	Dec. 31, 1935	75	8 - 1	\$187.50	\$1,145.30	
	3 small contracts	Various.	Various.	78	8 - .5	Various.	684.55	Each contract less than \$1,000.
Riverton	Mountain States Power Co.	Mar. 5, 1929	Dec. 31, 1934	300	6 - 1	1,000.00	17,167.34	
	Kinney-Coastal Oil Co.	June 10, 1930	June 12, 1931	10	6 - 1	50.00	4,037.57	
Shoshone	Mountain States Power Co.	July 1, 1930	July 1, 1940	1,200	2.5 - .5	5,020.00	60,438.95	
	Town of Powell	Mar. 21, 1930	May 20, 1940	160	5 - 1	640.00	11,424.67	
	C., B. & Q. R. Co.	June 1, 1923	Jan. 11, 1934	20	6 - 1	30.00	2,050.33	
	Shoshone Electric Light & Power Co.	Dec. 7, 1930	Dec. 6, 1935	140	2.5 - .5	50.00	1,324.50	
	3 small contracts	Various.	Various.	9	6 - 1	Various.	686.62	Each contract less than \$1,000.
Strawberry Valley	Town of Spanish Fork, Utah	May 1, 1928	May 1, 1931	185	6 - .75	740.00	14,780.30	A new contract is being made.
	Town of Payson, Utah	Feb. 5, 1928	Feb. 5, 1931	125	6 - .75	500.00	12,234.48	Do.
	Utah Packing Corporation	Jan. 1, 1926	Jan. 1, 1931	385 and 20	6 - .75	577.50-30	6,362.84	Do.
	Town of Springville, Utah	June 17, 1926	June 17, 1931		2 - 1	50.00	3,273.58	Do.
	Town of Salente, Utah	Feb. 5, 1928	Feb. 5, 1931	20	6 - .75	50.00	1,835.47	Residential lighting service.
	West Mountain Electric Co.	Dec. 30, 1929	Dec. 30, 1933		10 - 8	40.00	1,083.85	Each contract less than \$1,000.
	Several small contracts.	Various.	Various.	To production limit.	1 - .75	Various.	784.94	
Yuma	Southern Sierras Power Co.	July 14, 1926	July 14, 1936		4 - .75		41,891.40	
	3 small contracts	Various.	Various.				1,174.41	Do.

RECLAMATION TABLE 18.—Pumping plants operated on reclamation projects during fiscal year 1930-31

Project	Name of plant	Type of units	Plant capacity		Num- ber of Units	Static lift (feet)	First cost of plant	Cost of operation and main- tenance	Esti- mated deprecia- tion	Energy used for pumping (kilowatt hours)	Acre-feet pumped	Cost per acre- foot without depreciation	
			Horse- power	and- feet								Per acre- foot	Per foot lift
Boise Grand Valley Huntley ² Klamath	Black Canyon	V. T. D. S.	1,244	266	2	28.5	\$149,901.39	\$1,459.61	\$6,621.96	103,099		\$0.014	\$0.000496
	Price-Sub.	V. T. D. C.	125	28	1	31.0	46,697.83	485.99	1,000.00	4,856		.10	.00324
	Ballantine	V. T. D. C.	620	400	2	45.0	73,833.32	2,043.00	2,000.00	15,500		.132	.003
	Ballantine auxiliary	O. E. D. C.	400	46	2	45.0	71,103.56	5,649.00	3,500.00	4,800		1.18	.0262
	Tule Lake No. 1	V. M. D. S.	120	60	2	4.99	989.57	989.57	2,200.00	90,255		.142	.0285
	Tule Lake No. 2	V. M. D. S.	60	30	1	5.26	43,220.00	609.29	2,200.00	61,244		.144	.0274
	Tule Lake No. 3	V. M. D. S.	85	42	2	5.09	11,890.00	1,758.95	600.00	209,280		.136	.0274
	Tule Lake No. 4	V. M. D. S.	150	60	2		31,861.11	2,576.36	1,200.00	338,880		.138	.0267
	Dry Lake No. 1	V. T. D. C.	75	19.3	1	51.0	8,552.03	70.00	1,200.00	6,570		.212	.011
	Dry Lake No. 2	V. M. D. C.	100	15.4	1	44.8		50.00		103		.485	.0108
Lower Yellow- stone Mimodoka ²	Thomas Point	H. T. D. C.	220	45	2	31.0	49,970.43	282.34	1,000.00	9,546		.023	.00095
	Pumping plant No. 1	V. M. D. C.	4,600	886	5	28.99	186,020.00			11,371,732			
	Pumping plant No. 2	V. M. D. C.	3,730	800	5	30.72	184,920.00			10,821,514			
	Pumping plant No. 3	V. M. D. C.	1,900	440	3	29.82	103,107.00			5,981,910			
	Boersch Lake	V. M. D. C.	200	50	2	20.0	32,947.72			630,880			
	Canal 20 pump	V. M. D. C.	150		2					152,600			
	West End	H. M. D. C.	150	40	1	21.25	18,741.61			475,100			
	A-4 pumping station	Scoop wheel	25	20	1	3.5	3,328.43			36,245			
	1817 pumping station	H. M. D. C.	15	4	1	14.0	1,696.56			40,300			
	C-2 pumping station	Scoop wheel	10	11	1	4.8	3,634.71			14,010			
Newlands	Rupert pumping station	Scoop wheel	10		1	2.5		\$ 8,080.38					
	114 pumping station	H. M. D. C.	10		1					46,980			
	1812 pumping station	H. M. D. C.	7.5	4	1	7.0	2,803.97			13,159			
	MacKae pumping station	H. M. D. C.	7.5	2	1	4.0	1,008.76			6,730			
	5 small pumping stations	H. M. D. C.	7.5	2	1	14.0	894.77			13,540			
	3 drainage pumping plants	H. M. D. C.	70.0		5					77,165			
	Siltwater ³	V. M. D. C.	45.0	17	3	13	17,011.91			179,470			
	Labontan Rock Dam	V. M. D. C.	200	45	1	11.11	11,311.50	2,539.22	1,131.15	197,880	5,526	.46	.0414
	Scrimsner drain	H. M. D. C.	50	20	1	12.4	8,301.37	397.76	230.14	17,200	504	.79	.0637
	Wiggins drain	H. M. D. C.	10	2	1	10.74	1,248.18	341.38	125.00	4,020	62	5.50	.512
			7.5	2	1	6	996.31	202.01	100.00	3,907	78	2.60	.433

¹ Amount for June, 1931, estimated.² Operated by district or water users' association.³ Cost of operating all Mimodoka project pumps for year ending Oct. 31, 1930.⁴ Incomplete plant under construction.⁵ Plant operated from Apr. 25, 1931, to end of fiscal year.⁶ Plant operated from June 5, 1931, to end of fiscal year.⁷ Cost of pump not included.

Hillcrest.....	V. T. D. C.....	35	1.56	1	103	5,800.00	200.00	300.00	-----	320	.615	.006
Little Snipes Mountain.....	H. T. D. C.....	5	.33	1	50	1,065.00	65.00	68.71	-----	104	.625	.013
B lift.....	{1 V. M. D. C.....	{1,100	105	3	71.6	165,204.32	1 10,346.00	5,520.00	1,088,043	8,631.15	1.20	.0167
	{2 H. M. D. C.....											
Valley drainage.....	{1 O. E. D. C.....	{525	300	3	13.6	169,270.47	1 15,385.00	5,970.00	{ 1,305,500	{42,473.03	.36	.0267
	{2 H. M. D. C.....								{ 4,200			
Reservation.....	{1 G. E. G. C.....	{130	56	2	1.66	6,775.00	1 572.00	338.00	1,890	518.80	1.103	.664
	{1 G. E. D. C.....											
Drain test well.....	V. M. D. C.....	75	1	1	52	8,531.00	749.31	-----	23,040	193.26	3.877	.075
West Yuma.....	H. M. D. C.....	20	4.6	1	7	1,800.00	1 104.00	95.00	4,825	121.57	.855	.1222

¹ Amount for June, 1931, estimated.

² Operated by district or water users' association.

⁴ Gallons of fuel oil.

⁹ Plant operated about 1½ months. Abandoned temporarily.

Type: V. M. D. C.—Vertical motor-driven centrifugal pump.

H. M. D. C.—Horizontal motor-driven centrifugal pump.

S. T. D. C.—Steam turbine-driven centrifugal pump.

V. T. D. C.—Vertical hydraulic turbine-driven centrifugal pump.

H. T. D. C.—Horizontal hydraulic turbine-driven centrifugal pump.

O. E. D. C.—Oil engine-driven centrifugal pump.

G. E. D. C.—Gas engine-driven centrifugal pump.

G. E. G. C.—Gas engine gear-driven centrifugal pump.

V. T. D. C.—Vertical hydraulic turbine-driven screw pump.

V. M. D. S.—Vertical motor-driven screw pump.

RECLAMATION TABLE 19.—*Estimate of seepage and summary of drainage work to June 30, 1931*

State and project	Constructed drains ¹		Estimated area damaged by seepage on June 30, 1931	Estimated area protected by constructed drains	Estimated area that will be protected when all drains authorized have been constructed
	Open	Closed			
	Miles	Miles	Acres	Acres	Acres
Arizona: Salt River ^{2 3}	15.85	5.30	-----	60,000	60,000
Arizona-California:					
Yuma Reservation.....	11.70	4.00	-----	8,000	8,000
Yuma Valley.....	45.06	-----	2,000	34,500	50,000
Colorado:					
Grand Valley—					
Project lands.....	56.95	.48	100	7,200	7,300
Grand Valley drainage district.....	38.30	1.00	29,000	10,000	10,000
Teller Institute.....	2.80	-----	-----	300	300
Frey drain.....	1.60	-----	-----	300	300
Orchard Mesa.....	14.38	.24	50	2,200	2,200
Uncompahgre ⁴	5.50	99.50	17,000	10,700	10,700
Idaho:					
Boise—					
Riverside district.....	44.50	-----	500	11,300	11,300
Pioneer district.....	78.50	.40	6,000	24,800	24,800
Nampa and Meridian district.....	45.80	-----	1,400	51,000	51,000
Notus division.....	9.20	-----	50	6,800	6,800
Project lands.....	98.70	.30	800	31,700	31,700
King Hill ²88	-----	180	800	800
Minidoka—					
Gravity division.....	132.00	-----	850	30,550	30,550
Pumping division.....	16.60	-----	250	4,500	4,500
Montana:					
Huntley.....	28.75	52.40	353	22,810	⁵ 23,560
Milk River—					
Malta division.....	.50	.10	3,000	300	300
Glasgow division.....	1.20	.50	400	200	200
Sun River—					
Fort Shaw division.....	-----	-----	3,997	-----	-----
Greenfields division.....	27.80	-----	700	15,600	15,600
Montana-North Dakota:					
Lower Yellowstone.....	98.90	1.10	7,000	13,000	13,000
Nebraska-Wyoming:					
North Platte ² —					
Interstate division.....	41.84	12.42	2,500	8,000	8,000
Interstate division ⁶	57.10	-----	-----	-----	-----
Fort Laramie division.....	71.63	-----	1,000	21,000	21,000
Fort Laramie division ⁷	67.08	-----	-----	-----	-----
Northport division.....	8.42	-----	250	2,500	2,500
Nevada:					
Newlands ² —					
Carson division.....	256.10	3.99	1,000	80,352	⁸ 80,352
Truckee division.....	20.73	-----	65	6,635	⁸ 6,635
New Mexico: Carlsbad.....	14.30	3.43	3,000	7,700	7,700
New Mexico-Texas:					
Rio Grande—					
Rincon division.....	40.21	-----	2,000	16,000	17,000
Leasburg division.....	69.23	-----	3,000	30,700	31,000
Mesilla division.....	144.11	-----	8,300	48,200	50,000
El Paso division.....	192.64	-----	6,500	55,000	57,000
Oregon:					
Umatilla ²	14.30	.20	1,200	3,500	3,500
Vale-Warmsprings district.....	56.85	-----	-----	19,790	19,790
Oregon-California:					
Klamath—					
Main division.....	117.00	8.00	7,000	32,800	38,000
Tule Lake division.....	110.00	-----	100	18,000	33,000
Langell Valley division.....	16.00	-----	600	6,800	6,800

¹ Surface drains and waste ditches not included.² Projects being operated by water users or districts who have not furnished data to June 30, 1931. Data shown are from last report.³ Drainage largely by pumps, water recovered being used for irrigation purposes.⁴ Constructed by landowners, water users, or drainage districts.⁵ It is the plan of the districts to extend and improve the present drainage system to relieve the present seepage area.⁶ Outlet channels, of which 29.08 miles were built by the United States partly under cooperative contracts, 21.67 miles by the farmers' irrigation district, 2 miles by the Morrill drainage district, and 4.35 miles by drainage district No. 1.⁷ Outlet channels, of which 56.68 miles were built by the United States as part of canal wasteway and drainage system and 10.4 miles by the United States under cooperative contract with the Geuing irrigation district.⁸ Area benefited.

RECLAMATION TABLE 19.—*Estimate of seepage and summary of drainage work to June 30, 1931—Continued*

State of project	Constructed drains		Estimated area damaged by seepage on June 30, 1931	Estimated area protected by constructed drains	Estimated area that will be protected when all drains authorized have been constructed
	Open	Closed			
	<i>Miles</i>	<i>Miles</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
South Dakota: Belle Fourche.....	163.60	1.98	10,000	20,000	25,000
Utah: Strawberry Valley ² ⁴	18.90	71.50	8,500	11,422	19,922
Washington:					
Yakima ² —					
Sunnyside division.....	89.81	93.30	9,000	54,276	54,276
Tieton division.....	7.50	2.30	200	2,400	2,400
Wyoming:					
Riverton.....	6.16	-----	10	4,550	4,550
Shoshone—					
Garland division.....	149.30	134.23	200	38,800	38,800
Frannie division.....	84.36	-----	1,600	11,500	11,500
Willwood division.....	17.67	.02	100	3,500	10,000
Total.....	2,610.31	496.69	140,255	849,985	911,635

² Projects being operated by water users or districts who have not furnished data to June 30, 1931. Data shown are from last report.

⁴ Constructed by landowners, water users, or drainage districts.

⁵ All drainage work done by county drainage engineer through drainage improvement districts.

RECLAMATION TABLE 20.—Settlement and economic data, 1930-31

State and project	Irrigated farms		Towns		Num- ber of schools	Num- ber of churches	Banks		
	Number	Population	Number	Population			Capital stock	Deposits	Number of depos- itors
Arizona, Salt River.....	7,500	50,000	12	93,000	86	70	\$2,320,000	\$33,123,000	30,000
Arizona-California, Yuma.....	1,821	4,141	5	9,625	14	25	50,000	861,940	4,600
California, Orland.....	700	1,747	1	1,200	10	10	190,000	1,063,500	3,365
Colorado:									
Grand Valley.....	488	1,176	6	15,315	24	36	365,000	4,000,000	9,000
Uncompangre.....	1,790	5,616	3	7,095	27	27	385,000	3,019,540	11,250
Idaho:									
Boise.....	4,007	15,000	16	51,300	56	82	2,195,000	28,000,000	36,000
King Hill.....	185	546	3	1,550	5	5	20,000	282,730	1,050
Mimodoka.....	2,270	6,927	6	7,480	22	30	200,000	2,200,100	4,600
Montana:									
Huntley.....	609	1,763	5	700	8	8	25,000	150,000	400
Milk River.....	451	1,457	17	8,235	32	33	280,000	4,463,000	8,150
Sun River.....	477	1,004	6	495	10	10	70,000	247,000	1,046
Montana-North Dakota, Lower Yellowstone.....	406	1,471	8	3,100	17	20	137,000	712,000	2,087
Nebraska-Wyoming, North Platte.....	2,867	9,418	18	22,195	82	61	470,000	5,463,290	16,960
Nebraska, Newlands.....	683	2,949	13	2,020	13	9	75,000	1,022,630	1,850
New Mexico, Carlsbad.....	440	2,418	4	4,612	8	11	50,000	575,000	1,600
New Mexico-Texas, Rio Grande.....	4,800	28,400	36	147,602	84	112	1,805,000	30,400,130	40,031
Oregon:									
Umatilla.....	200	826	2	1,055	3	4	25,000	270,000	1,250
East division.....	186	325	3	400	3	3			
Vale.....	39	243	3	1,122	3	5	50,000	284,900	500
Oregon-California, Klamath.....	706	3,162	5	16,780	36	24	515,000	6,250,000	16,000
South Dakota, Belle Fourche.....	694	2,194	5	3,129	3	3	150,000	2,500,000	4,500
Utah, Strawberry Valley.....	2,200	5,550	12	25,000	27	25	325,000	1,478,000	8,821
Washington:									
Okanogan.....	406	947	3	4,400	6	8	125,000	1,133,370	2,500
Yakima.....									
Sunnyside.....	3,457	10,109	10	7,534	42	31	210,000	2,397,000	7,380
Tieton.....	1,380	4,062	8	28,000	12	11	18,500	125,000	500
Kitittas.....	600	1,900	5	8,217	22	16	375,000	3,678,240	10,949
Wyoming:									
Riverston.....	22	65	2	62	3	2			
Shoshone.....	860	2,310	5	1,500	5	9	70,000	555,800	1,625
Total.....	40,354	165,956	213	472,723	688	724	10,700,500	134,261,170	226,014

1 Includes towns in and adjacent to project.

RECLAMATION TABLE 21.—*Irrigation and crop results on Government reclamation projects, 1930¹*

State and project	Lands on projects covered by crop census					Other lands served by Government works, usually by a partial water supply through private canals under Warren Act or other water service contracts				
	Irrigable acreage	Irrigated acreage	Cropped acreage	Crop value		Irrigable acreage	Irrigated acreage	Cropped acreage	Crop value	
				Total	Per acre				Total	Per acre
Arizona: Salt River.....	246, 130	223, 013	216, 723	\$16, 540, 314	\$76. 32	90, 392	60, 473	60, 473	\$3, 089, 700	\$51. 09
Arizona-California:										
Yuma.....	65, 895	55, 074	52, 992	2, 994, 020	56. 50	240	213	170	26, 650	154. 49
Valley division.....	49, 625	42, 121	42, 121	2, 453, 402	58. 25					
Reservation division.....	14, 275	10, 310	10, 089	411, 003	40. 74					
Yuma auxiliary (Mesa).....	1, 995	1, 191	782	129, 615	165. 81					
California: Orland.....	20, 770	14, 091	12, 454	578, 706	46. 47					
Colorado:										
Grand Valley.....	30, 380	15, 804	15, 099	472, 185	31. 27	18, 400	14, 000	13, 400	956, 000	71. 34
Uncompagre.....	75, 655	59, 998	59, 875	1, 606, 250	26. 83	1, 650	1, 550	1, 545	38, 625	25. 00
Idaho:										
Boise.....	170, 575	167, 242	154, 059	4, 057, 819	26. 34	139, 600	133, 800	129, 300	3, 306, 500	25. 60
New York irrigation district.....	17, 023	16, 505	15, 099	326, 977	21. 66					
Nampa-Meridian irrigation district.....	40, 963	38, 926	37, 101	958, 016	25. 83					
Boise-Kuna irrigation district.....	48, 345	47, 514	43, 240	1, 077, 242	24. 91					
Wilder irrigation district.....	56, 665	55, 882	50, 449	1, 470, 990	29. 16					
Big Bend irrigation district.....	1, 000	1, 000	1, 571	39, 785	25. 32					
Black Canyon irrigation district.....	6, 875	6, 755	6, 599	184, 809	28. 01					
King Hill.....	8, 000	6, 941	6, 853	197, 932	28. 88					
Minidoka.....	120, 155	107, 200	99, 990	3, 206, 284	32. 07	780, 710	667, 180	641, 565	24, 023, 520	37. 50
Gravity division.....	71, 235	61, 561	57, 724	1, 837, 510	31. 83					
Pumping division.....	48, 920	45, 639	42, 266	1, 368, 774	32. 38					
Montana:										
Huntley.....	32, 540	23, 488	23, 488	1, 110, 523	47. 28					
Milk River.....	134, 285	49, 021	48, 039	939, 385	19. 97					
Malta division.....	56, 652	17, 067	16, 645	290, 243	17. 44					
Glasgow division.....	22, 133	5, 495	5, 378	71, 577	13. 31					
Chinook division.....	55, 500	26, 459	26, 016	597, 565	22. 97					
Sun River.....	53, 875	33, 274	33, 274	442, 918	13. 31					
Fort Shaw division.....	13, 900	7, 312	7, 312	133, 820	18. 34					
Greenfields and Big Coulee division.....	41, 975	25, 962	25, 962	309, 098	11. 91					

¹ Data are for calendar year (irrigation season) except on Salt River project, where data are for corresponding "agricultural year," October, 1929, to September, 1930.² Areas for which bureau was prepared to supply water in 1930.

[illegible]

2 Of this area 38.844 acres were irrigated, the remainder being cropped without irrigation.

⁴ Areas and values by projects as follows:

Milk River.....	12,356	52,264
Atata division.....	6,524	24,670
Glasgow division.....	5,832	27,594
Sun River.....	3,074	20,610
Lower Yellowstone.....	6,208	28,105
Klamath.....	62,368	514,945
		8,30

RECLAMATION TABLE 22.—*Summary of crop results on reclamation projects in 1930*

[NOTE.—These detailed figures are limited to crops covered by census on Government projects proper, excluding all crops in areas served with water under the Warren Act, but including nonirrigated crops grown on the project]

Crop	Acreage cropped		Yields		Crop value		
	Total	Per cent of cropped	Total	Average per acre	Average per acre	Total	Per cent of total value of all crops
Cereals:			<i>Bushels</i>				
Barley.....	83,285	5.4	2,883,129	34.6	\$15.10	\$1,257,431	1.9
Corn.....	54,653	3.5	1,635,595	29.9	20.90	1,142,677	1.8
Oats.....	45,401	3.0	1,654,161	36.4	10.10	457,871	.7
Rye.....	5,110	.3	92,440	18.1	9.85	50,268	.1
Wheat.....	135,201	8.8	3,613,865	26.7	16.80	2,274,240	3.5
Total.....	323,650	21.0	9,879,190	30.5	16.03	5,182,487	8.0
Other grain and seed:							
Alfalfa seed.....	22,456	1.4	93,141	4.2	38.75	870,562	1.3
Clover seed.....	14,841	.9	59,207	4.0	36.20	537,084	.8
Flaxseed.....	6,279	.4	41,783	6.7	9.30	58,364	.1
Total.....	43,576	2.8	194,131	4.5	33.60	1,466,010	2.2
Hay and forage:			<i>Tons</i>				
Alfalfa hay.....	452,526	29.2	1,312,415	2.9	26.40	11,940,274	18.4
Clover hay.....	15,996	1.0	23,045	1.4	9.40	150,256	.2
Other hay.....	57,704	3.8	69,024	1.2	8.70	502,088	.8
Corn fodder.....	9,792	.6	61,156	6.3	39.50	383,629	.6
Other forage.....	19,733	1.3	14,133	.7	13.60	294,917	.5
Pasture.....	343,454	22.1			10.00	3,444,441	5.3
Total.....	899,205	58.0	1,479,773	1.6	18.57	16,715,605	25.8
Vegetables and truck:			<i>Bushels</i>				
Beans.....	28,932	1.9	778,071	26.9	44.60	1,290,178	2.0
Onions.....	2,762	.2	954,430	345.5	333.00	918,788	1.4
Potatoes, white.....	55,752	3.6	12,556,237	225.6	86.60	4,822,241	7.4
Potatoes, sweet.....	884		93,555	105.7	145.50	128,691	.2
Truck.....	42,982	2.7			111.80	4,797,627	7.4
Total.....	131,312	8.4	14,382,293	109.6	91.20	11,957,525	18.4
Fruits and nuts:			<i>Pounds</i>				
Apples.....	24,174	1.5	332,915,952	13,800	163.50	3,950,158	6.1
Peaches.....	3,518	.2	16,528,960	4,700	96.50	339,250	.5
Pears.....	7,062	.5	68,314,111	9,680	99.70	703,150	1.1
Prunes.....	2,469	.1	18,590,352	7,530	74.60	184,305	.2
Citrus fruit.....	4,949	.3	63,768,110	12,870	315.50	1,561,015	2.4
Small fruit.....	3,388	.2	24,268,230	7,160	232.00	784,859	1.2
Miscellaneous.....	21,913	1.5	193,400,313	8,820	115.30	2,526,213	3.9
Total.....	67,473	4.3	717,786,028	10,630	148.30	10,048,950	15.4
Miscellaneous:			<i>Tons</i>				
Sugar beets.....	79,897	5.1	1,043,847	13.1	94.70	7,575,664	11.6
Cotton.....	192,120	12.4	175,809	1.9	59.40	11,398,544	17.6
Cottonseed.....	47,025	3.0	78,924	.4	14.10	662,485	1.0
Other crops.....							
Total.....	319,042	20.5			61.60	19,636,693	30.2
Duplication.....	233,291	15.0					
All crops for which detailed census was taken.....	1,550,967	100.0			41.90	65,007,270	100.0
Warren Act projects ³	1,254,493				43.56	54,654,550	
Total.....	2,805,460				42.65	119,661,820	

¹ Bales.² The dry-farmed area of this total amounted to 83,870 acres, with a total value of \$588,330.³ Totals only available. Acreage, yield, and value not compiled by crops.

RECLAMATION TABLE 23.—Irrigated and cropped acreage and crop values by years, 1906-1930

	Federal irrigation projects				Warren Act land				Entire area			
	Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	1 20, 100	\$244, 900	\$5, 005, 300					22, 300	1 20, 100	\$244, 900	\$5, 005, 300
1907	187, 600	1 169, 000	4, 760, 400	7, 575, 800					187, 600	1 169, 000	4, 760, 400	7, 575, 800
1908	289, 500	1 260, 500	7, 575, 800	12, 581, 100					289, 500	1 260, 500	7, 575, 800	12, 581, 100
1909	410, 600	1 369, 500	11, 920, 700	24, 501, 800					410, 600	1 369, 500	11, 920, 700	24, 501, 800
1910	465, 100	413, 000	37, 476, 400	50, 185, 000					465, 100	413, 000	37, 476, 400	50, 185, 000
1911	541, 400	470, 100	12, 708, 600	64, 010, 400					541, 400	470, 100	12, 708, 600	64, 010, 400
1912	588, 400	540, 000	13, 825, 400	79, 742, 600					588, 400	540, 000	13, 825, 400	79, 742, 600
1913	699, 200	642, 200	15, 732, 200	96, 218, 100					699, 200	642, 200	15, 732, 200	96, 218, 100
1914	761, 300	703, 400	16, 475, 500	114, 418, 100					761, 300	703, 400	16, 475, 500	114, 418, 100
1915	814, 900	760, 000	18, 200, 000	147, 234, 100					814, 900	760, 000	18, 200, 000	147, 234, 100
1916	923, 000	858, 300	32, 816, 000	203, 696, 400					923, 000	858, 300	32, 816, 000	203, 696, 400
1917	1, 057, 500	966, 800	56, 462, 300	270, 517, 800					1, 057, 500	966, 800	56, 462, 300	270, 517, 800
1918	1, 141, 500	1, 051, 200	66, 821, 400	359, 491, 900	1 1481, 600	880, 600	\$35, 000 000	\$99, 000 000	1 1 642, 600	1, 051, 200	101, 821, 400	305, 517, 800
1919	1, 187, 300	1, 113, 500	88, 974, 100	425, 663, 600	916, 300	950, 900	64, 000 000	146, 505, 800	2 1 103, 600	1, 194, 100	132, 974, 100	458, 491, 900
1920	1, 223, 500	1, 153, 800	66, 171, 700	475, 283, 900	981, 900	969, 600	47, 505, 800	191, 411, 900	2 203, 400	2, 104, 700	153, 677, 500	572, 169, 400
1921	1, 227, 500	1, 157, 900	49, 620, 300	525, 644, 800	1, 001, 300	961, 600	44, 906, 100	224, 652, 700	2 228, 800	2, 127, 500	94, 526, 400	666, 695, 800
1922	1, 202, 130	1, 169, 100	50, 360, 900	590, 691, 100	983, 300	951, 300	33, 240, 800	262, 210, 600	2 185, 430	2, 120, 400	83, 601, 700	750, 297, 500
1923	1, 213, 700	1, 179, 870	65, 046, 300	657, 179, 700	1, 051, 400	993, 000	37, 557, 900	305, 448, 100	2 265, 100	2, 172, 870	102, 604, 200	852, 901, 700
1924	1, 290, 900	1, 216, 600	66, 488, 600	734, 788, 600	930, 700	889, 500	43, 237, 500	359, 104, 000	2 221, 600	2, 106, 100	109, 726, 100	962, 627, 800
1925	1, 320, 300	1, 242, 800	77, 608, 900	795, 453, 500	1, 019, 200	951, 300	53, 655, 900	408, 854, 000	2 339, 500	2, 194, 100	131, 264, 800	1, 093, 892, 600
1926	1, 411, 000	1, 361, 500	60, 664, 900	867, 500, 700	1, 097, 200	949, 600	49, 750, 000	470, 014, 000	2 508, 200	2, 311, 100	110, 414, 900	1, 204, 307, 500
1927	1, 379, 000	1, 431, 600	72, 047, 200	948, 578, 500	1, 148, 100	1, 072, 500	61, 160, 000	532, 509, 300	2 527, 100	2, 504, 100	133, 267, 200	1, 337, 574, 700
1928	1, 442, 100	1, 480, 200	81, 077, 800	1, 037, 037, 890	1, 235, 000	1, 192, 900	62, 495, 300	605, 229, 790	2 677, 100	2, 681, 200	143, 573, 100	1, 481, 067, 800
1929	1, 483, 900	1, 512, 250	88, 459, 390	1, 102, 045, 160	1, 234, 230	1, 192, 900	72, 720, 490	54, 654, 550	2 718, 130	2, 705, 240	161, 179, 880	1, 642, 267, 680
1930	1, 504, 810	1, 550, 967	65, 007, 270		1, 286, 046	1, 254, 493			2 790, 856	2, 805, 460	119, 661, 820	1, 761, 929, 500

1 Estimated.

RECLAMATION TABLE 24.—Crop reports on Government reclamation projects in 1930¹
 AREA (ACRES)

State and project	Cereals					Other grain and seed					Hay and forage					Total	
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed	Flax seed	Total	Alfalfa hay	Clover hay	Other hay	Corn fodder	Other forage		Pasture
Arizona: Salt River	4,849				7,687	12,536	4,500				4,500	77,464		2,526	10,242	114,584	205,905
Arizona-California: Yuma	317	7	25		912	1,261	9,749	2		9,751	12,520		10,446		3,688	2,641	29,295
Valley division	106		25		854	985	8,056			8,056	9,871		8,710		2,821	2,142	23,544
Reservation division	211	7			58	276	1,693	2		1,695	2,632		1,736		867	499	5,734
Yuma auxiliary (Mesa)											17						17
California: Orland	551	1,293	90		68	2,002					5,176		173	27	25	3,900	9,301
Colorado: Grand Valley		1,660	444		768	2,872	79			79	4,810			1,660	5,142	969	12,581
Uncompahgre	2,053	4,661	3,665	22	6,437	16,838	103	679		782	24,536	333	135	19	63	4,696	29,782
Idaho: Boise	8,491	6,157	3,633	92	31,024	49,397	3,723	7,347	14	11,084	58,899	7,660	263	390	346	32,992	90,550
New York irrigation district	853	10	561		2,712	4,136	44	518	14	576	5,781	756	102	93		3,759	10,491
Nampa-Meridian irrigation district	2,379	953	843		6,956	11,131	552	1,612		2,164	13,550	1,959	75	163		7,475	23,222
Boise-Kuna irrigation district	2,712	1,532	1,114		9,860	15,218	343	2,252		2,595	16,837	2,242	80	63		6,382	25,604
Wildor irrigation district	2,510	3,484	966	89	9,560	16,609	1,929	2,492		4,421	19,210	2,218	6	71	346	4,541	26,392
Big Bend irrigation district																	
Black Canyon irrigation district	37	67	81	3	245	433	205	38		243	547	66				235	848
King Hill		111	68		1,691	1,870	650	435		1,085	2,974	419				600	3,993
Mindoka	552	449	78		1,885	1,964	607	215		822	3,270	235	36			521	4,079
Gravity division	3,858	375	2,050	18	13,302	19,693	825	5,310		6,135	33,888	3,094	52	67	78	11,659	48,838
Pumping division	2,157	369	1,513	18	5,406	9,463	723	1,810		2,533	21,151	811	52	45	78	8,392	30,529
Montana:	1,701	6	537		7,896	10,140	102	3,500		3,602	12,737	2,283		22		3,267	18,309
Huntley	2,200	217	772		1,455	4,644	234			234	5,188	41	51	18		4,512	9,810
Milk River	3,601	68	2,530	25	7,095	13,319	1,192	43		4,080	10,180	264	15,669	136		1,209	27,358
Malta division	617	32	243	25	1,634	2,551	537			748	3,580		8,166	82		858	12,686
Glasgow division	105		180		2,060	2,345	320			370	1,926		833	5			2,764
Chinook division	2,879	36	2,107		3,401	8,423	335	43		2,962	4,674	264	6,570	49		351	11,908
Sun River	1,958	44	1,575	14	14,903	18,494	140	95		686	9,800	1,247	764	16		1,470	13,297
Fort Shaw division	398	43	484	10	780	1,715	105	2		114	4,229	68	387	16		390	5,090
Greenfields and Big Coulee division																	
Montana-North Dakota: Lower Yellowstone	1,560	1	1,091	4	14,123	16,779	35	93	444	572	5,571	1,179	377			1,080	8,207
District No. 1	3,827	749	1,136	80	2,042	7,834	54	10	987	1,051	5,290	388	734	359		2,065	8,836
District No. 2	2,566	514	760	33	1,452	5,325	12	10	673	695	4,049	287	525	344		927	6,132
District No. 2	1,261	235	376	47	590	2,509	42		314	356	1,241	101	209	15		1,138	2,704
Nebraska-Wyoming: North Platte	29,437	24,293	12,272	1,135	4,421	71,558	95	708		803	43,515	1,051	2,021			10,525	57,112

Pathfinder irrigation district.....	13,204	15,273	4,543	763	1,784	35,567	321	321	23,432	666	422	-----	3,774	28,294	
Gering and Fort Laramie irrigation district.....	7,679	3,722	4,020	29	1,185	16,635	24	280	304	10,786	36	283	-----	1,929	
Goshen irrigation district.....	7,447	1,691	2,620	12	1,108	12,887	12	-----	12	7,635	114	1,261	-----	4,091	
Northport irrigation district.....	1,107	3,607	1,080	331	344	6,469	59	107	166	1,662	235	55	-----	731	
Nevada: Newlands.....	931	135	127	176	3,839	5,081	475	-----	475	30,507	50	566	-----	30,900	
New Mexico: Carlsbad.....	46	-----	-----	-----	52	225	-----	-----	-----	3,584	-----	-----	-----	61,556	
New Mexico-Texas: Rio Grande.....	104	6,469	212	-----	619	7,404	15	-----	15	25,634	-----	1,076	1,028	30,235	
Elephant Butte irrigation district.....	104	5,610	107	-----	363	6,184	-----	-----	13,730	-----	287	808	90	16,724	
El Paso County water improvement district No. 1.....	859	105	-----	-----	256	1,220	15	-----	15	11,904	-----	789	220	1,809	
Oregon: Vale.....	63	288	230	-----	528	821	-----	-----	38	-----	223	41	-----	591	
Umatilla.....	9	288	7	-----	134	438	-----	22	22	5,105	8	185	-----	45	
East division.....	9	93	7	-----	105	214	-----	22	22	3,235	158	150	-----	3,957	
West division.....	195	-----	-----	-----	29	224	-----	22	22	1,870	8	123	-----	2,874	
Oregon-California: Klamath.....	1,435	-----	999	598	4,685	7,717	-----	57	57	13,223	112	3,529	-----	1,083	
Main division.....	852	-----	398	440	2,607	4,317	-----	57	57	7,855	112	2,415	-----	3,119	
Tule Lake division.....	583	-----	601	138	2,078	3,400	-----	57	57	5,368	-----	-----	-----	16,567	
South Dakota: Belle Fourche.....	5,709	3,131	4,719	373	3,469	17,401	119	104	1,075	1,298	14,355	323	1,942	14,602	
Utah: Strawberry Valley.....	1,301	151	854	-----	4,989	7,295	-----	-----	17,834	277	93	-----	4,592	24,984	
High Line division.....	597	118	223	-----	1,848	2,786	-----	-----	9,211	10	38	-----	2,867	24,984	
Mapleton division.....	49	3	42	-----	482	576	-----	-----	1,548	-----	1	-----	253	28,447	
Spanish Fork division.....	605	24	542	-----	2,432	3,603	-----	-----	5,826	251	47	-----	1,079	33,431	
Springville division.....	50	6	47	-----	227	330	-----	-----	1,249	16	7	-----	393	14,602	
Washington: Okanogan.....	1,484	4,166	2,642	-----	9,385	17,677	-----	-----	26	-----	50	27	-----	9,167	
Yakima.....	423	3,758	1,466	-----	6,775	12,422	-----	-----	36,137	3,122	760	-----	21,753	22,796	
Sunnyside division.....	282	407	348	-----	735	3,473	-----	-----	29,300	1,607	613	-----	13,688	12,126	
Tieton division.....	779	1	828	-----	1,875	3,483	-----	-----	3,475	3,365	147	-----	2,080	1,802	
Kittitas division.....	-----	-----	-----	-----	-----	-----	-----	-----	3,362	1,150	-----	-----	6,035	1,802	
Wyoming: Shoshone.....	3,585	54	2,892	-----	3,522	10,054	143	215	2	360	9,229	734	-----	8,551	
Garland division.....	2,549	36	1,491	-----	2,586	6,662	10	175	2	187	6,150	573	-----	5,508	
Frankie division.....	386	12	1,033	-----	480	1,911	123	-----	123	2,559	56	69	-----	12,477	
Willwood division.....	651	6	368	-----	456	1,481	10	40	50	520	105	23	-----	2,816	
Riverton.....	14	14	188	16	9	241	-----	-----	444	242	44	-----	227	5,500	
Total with irrigation.....	76,330	54,427	41,140	2,549	122,230	296,676	22,053	14,807	5,374	42,234	450,652	15,782	42,781	9,412	280,821
Cropped without irrigation (areas on Milk River, Sun River, Lower Yellowstone, and Klamath projects).....	6,955	226	4,261	2,561	12,971	26,974	403	34	905	1,342	1,874	214	14,923	380	819,181
Grand total.....	83,285	54,653	45,401	5,110	135,201	323,650	22,456	14,841	6,279	43,576	452,526	15,996	57,704	9,792	819,181
															80,024
															899,205

Data are for calendar year (irrigation season) except on Salt River project, where data are for corresponding "agricultural year," October, 1929, to September, 1930.

RECLAMATION TABLES 24-26.—*Crop reports on Government reclamation projects in 1930*

NO. 24. AREA (ACRES)

State and project	Vegetables and truck						Fruit and nuts							
	Beans	Onions	Potatoes (white)	Potatoes (sweet)	Truck	Total	Apples	Peaches	Pears	Prunes	Citrus fruit	Small fruit	Miscellaneous	Total
Arizona: Salt River.	310		235	483	28,765	29,793						612	13,814	18,249
Arizona-California: Yuma														
Valley division.	13	1	26	11	2,035	2,086			3		797	94	1,389	2,283
Reservation division.	1	1	26	8	1,995	2,031			3		16	31	1,384	1,434
Yuma auxiliary (Mesa)	12			3	40	55					32	58	4	94
California: Orland											749	5	1	755
Colorado:														
Grand Valley.	4,006		642		234	4,882	1,001	103				84		103
Uncompahgre.	1,015	2,249	3,531		426	7,221		61						1,146
Idaho:														
Boise.	141	412	2,594		836	3,983	2,553	195	14	1,071		196		4,029
New York irrigation district.			3		50	53	212			206				418
Nampa-Meridian irrigation district.		164	437		239	840	945			236		21		1,202
Boise-Kuna irrigation district.		121	522		257	900	481	4		94		113		692
Wildier irrigation district.	141	122	1,593		250	2,106	915	191	14	535		62		1,717
Big Bend irrigation district.		10	5		15	10								
Black Canyon irrigation district.		34			30	69								
King Hill.	348	5	193		80	626	207	11	6			5	51	280
Minidoka.	4,027	17	15,325		1,162	20,531	45							45
Gravity division.	3,447	14	7,531		968	11,960	45							
Pumping division.		3	7,794		194	8,571								
Montana:														
Humtley.	3,668		38		106	3,812								
Milk River.	108		690		99	900								
Malta division.		2	83		37	122								
Glasgow division.			17		10	27								
Chinook division.	108	1	590		52	751								
Sun River.	15		306		87	408								
Fort Shaw division.			276		69	354								
Greenhields and Big Coulee division.	6		30		18	54								
Montana-North Dakota:														
Lower Yellowstone.	1,891		187		153	2,231						3		3
District No. 1.	915		135		108	1,158						3		3
District No. 2.	976		52		45	1,073								

[illegible]

RECLAMATION TABLES 24-26.—Crop reports on Government reclamation projects in 1930—Continued

No. 24. AREA (ACRES)—Continued

State and project	Miscellaneous				Irrigated, no crop						Total ir- rigated without crop	Grand total ir- rigated
	Sugar beets	Cotton	Other	Total	Dupli- cated	Total cropped	Young alfalfa	Young fruit	Fall plowing	Miscel- laneous	Dupli- cated	
Arizona: Salt River.....		49,631	58	49,689	103,949	216,723	23,926	6,290			23,926	223,013
Arizona-California:												
Yuma.....		28,073	32,254	60,327	52,011	52,992		7,324			5,651	55,074
Valley division.....		22,123	26,194	48,317	42,353	42,121		6,995			5,543	43,573
Reservation division.....		5,950	6,050	12,000	9,659	10,089		329			108	10,310
Yuma auxiliary (Mesa).....			10	10		782		429			20	409
California: Orland.....			38	38	2,696	12,454	1,015	290		401	69	14,091
Colorado:												
Grand Valley.....	1,136		286	1,422	6,840	15,099	495		994	358	1,142	15,804
Uncompangre.....	3,803		494	4,297	191	59,375	1,042	22	7,459	100	8,500	59,998
Idaho:												
Boise.....			5,221	5,221	10,205	154,059	4,676	329	7,027	12,548	11,397	167,242
New York irrigation district.....			3	3	578	15,099	469	1	638	1,405	1,127	16,505
Nampa-Meridian irrigation district.....			1,539	1,539	2,997	37,101	842	66	2,321	1,960	3,364	38,926
Boise-Kuna irrigation district.....			430	430	2,199	43,240	2,720	25	2,630	3,854	4,955	47,514
Wildor irrigation district.....			2,968	2,968	3,764	50,449	153	237	553	5,240	750	55,882
Big Bend irrigation district.....			281	281	249	1,571				89		1,660
Black Canyon irrigation district.....					418	6,599	492		865		1,201	6,755
King Hill.....			25	25	943	6,553	289	28		60	289	6,941
Minidoka.....	6,489		3	6,492	1,654	99,990	2,973			6,289	2,052	107,200
Gravity division.....	3,191		3	3,194		57,724	921			2,916		61,561
Pumping division.....	3,298			3,298	1,654	42,266	2,052			3,373	2,052	45,639
Montana:												
Huntley.....	4,988			4,988		23,488						23,488
Milk River.....	3,176		2	3,178	796	48,039	3,326		5,437		7,781	49,021
Malta division.....	985			985	447	16,645	722				1,253	17,067
Glasgow division.....	4		4	132	5,378	5,378	192		683		758	5,495
Chinook division.....	2,187		2	2,189	217	26,016	2,412		3,801		5,770	26,439
Sun River.....	42		347	389		33,274						33,274
Fort Shaw division.....	39			39		7,312						7,312
Greenfields and Big Coulee division.....	3		347	350		25,962						25,962
Montana-North Dakota:												
Lower Yellowstone.....	7,402		1,324	8,726		28,681						28,681
District No. 1.....	5,649			5,649		19,467						19,467
District No. 2.....	1,753		819	2,572		9,214						9,214

REPORT OF COMMISSIONER OF RECLAMATION

RECLAMATION TABLES 24-26.—Crop reports on Government reclamation projects in 1930—Continued

No. 25. YIELDS

State and project	Cereals					Other grain and seed				Hay and forage			
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed	Flax seed	Total	Alfalfa hay	Clover hay	Other hay
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Tons	Tons	Tons
Arizona: Salt River	181,830				99,931	281,761	26,625			26,625	309,856		
Arizona-California:													
Yuma	4,959	110	475		12,873	18,417	45,099	9		451,006	22,650		8,588
Valley division	3,146		475		12,627	16,248	37,226			372,226	18,956		7,229
Reservation division	1,813	110			246	2,169	7,873	9		78,740	3,639		1,359
Yuma auxiliary (Mesa)										55			55
California: Orland	14,150	58,855	1,696		1,231	75,935					24,335	406	176
Colorado:													
Grand Valley		48,714	9,919		17,489	76,122	126			126	12,309		81
Uncompahgre	69,186	158,007	119,487	602	175,090	522,372	300	1,836		2,136	58,887	533	55
Idaho:													
Boise	397,132	254,497	169,718	2,140	1,194,856	2,018,343	7,883	27,010	36	34,629	190,532	11,563	537
New York irrigation district	34,509	510	2,948		93,863	150,880	64	1,241	36	1,341	16,203	1,177	3,365
Nampa-Meridian irrigation district													
Boise-Kuna irrigation district	107,943	39,439	48,564		261,532	487,478	1,084	5,892		6,946	40,826	2,870	178
Wilder irrigation district	111,042	61,737	48,126		368,135	589,040	686	8,476		9,156	52,411	3,093	126
Big Bend irrigation district	112,810	144,971	43,620	2,116	333,213	686,730	4,068	9,743		14,411	64,660	3,782	30
Black Canyon irrigation district	1,270	3,340	4,430	24	11,624	20,688	1,081	244		1,325	1,782	192	1,087
King Hill	29,558	4,500	3,030		76,489	113,577		1,450		1,450	14,650	449	48
Minidoka	181,213	11,525	2,933		552,880	847,214	2,380	25,596		28,694	91,424	5,305	247
Gravity division	95,404	12,196	71,587	668	222,939	402,794	2,823	13,676		16,499	61,232	2,325	247
Pumping division	85,809	140	28,530		329,941	444,420	276	11,919		12,195	30,192	2,980	176
Montana:													
Huntley	69,263	5,578	31,793		29,600	136,264	750			750	14,087	46	76
Milk River	81,552	2,564	73,584	500	110,639	270,839	2,643	52	23,264	25,859	19,735	309	9,994
Natta division	9,652	1,030	8,095	500	20,554	39,801	1,420		684	2,104	7,424		4,662
Glasgow division	1,168		3,510		20,034	24,712	467			375	4,108		5
Chinook division	70,732	1,534	63,979		70,021	206,266	256	52	22,205	23,013	8,203	309	4,730
Sun River	51,335	1,269	49,808	390	271,431	374,283	255	496	4,047	4,798	16,749	1,562	67
Fort Shaw division	11,015	1,249	15,765	290	14,838	43,157	185	7	140	332	7,075	78	354
Greenfields and Big Coulee divisions	40,320	20	34,043	100	256,643	331,126	70	489	3,907	4,466	9,674	1,484	298
Montana-North Dakota:													
Lower Yellowstone	80,807	18,439	30,721	1,403	40,759	172,129	130	100	6,414	6,644	10,017	391	1,218
District No. 1	85,015	15,457	20,770	808	30,526	125,576	36	100	4,958	5,094	7,851	284	498
District No. 2	22,792	2,982	9,951	595	10,233	46,553	94		1,456	1,550	2,166	107	720

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RECLAMATION TABLES 24-26.—Crop reports on Government reclamation projects in 1930—Continued

No. 25. YIELDS—Continued

State and project	Vegetables and truck					Miscellaneous			
	Beans	Onions	White potatoes	Sweet potatoes	Total	Sugar beets	Cotton	Cotton-seed	
	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Tons</i>	<i>Bales</i>	<i>Tons</i>	
Arizona: Salt River	139,500		19,583	48,300	207,883		43,553	21,777	
Arizona-California:									
Yuma	308	39	2,758	627	3,732				
Valley division	8	39	2,758	527	3,332		21,034	10,132	
Reservation division	300			100	400		4,129	2,072	
California: Orland	133				133				
Colorado:									
Grand Valley	31,294		87,510		168,804	9,731			
Uncompahgre	33,645	800,642	726,022		1,560,309	31,182			
Idaho:									
Boise	5,043	135,549	620,808		761,400				
New York irrigation district			600						
Nampa-Meridian irrigation district									
Boise-Kuna irrigation district		59,701	108,450		168,151				
Wilder irrigation district		33,530	118,892		152,422				
Big Bend irrigation district	5,043	42,318	386,891		434,252				
Black Canyon irrigation district			875		875				
King Hill			5,100		5,100				
Minidoka	5,631	1,185	34,933		41,799				
Gravity division	136,272	4,800	4,037,791		4,178,863	62,563			
Pumping division	122,031	3,700	1,897,791		2,023,522	29,254			
Montana:	14,241	1,100	2,140,000		2,155,341	33,309			
Hundley	99,960		5,998		105,958	70,488			
Milk River	1,035	552	113,882		115,469	39,023			
Malta division	4	312	20,674		20,990	11,875			
Glasgow division			1,889		1,889	68			
Chinook division			91,319		92,590	27,080			
Sun River	1,031	240	26,038		26,262	498			
Fort Shaw division	224		23,084		23,278	481			
Greenfields and Big Coulee division	194		2,954		2,984	17			
Montana-North Dakota:									
Lower Yellowstone	30								
District No. 1	25,827		31,053		56,880	91,907			
District No. 2	11,801		22,634		34,435	68,501			
District No. 2	14,026		8,419		22,445	23,406			

Nebraska-Wyoming:									
North Platte	97,256	2,430	2,403,006	2,502,692	566,588				
Pathfinder irrigation district	31,052	1,491,420	1,522,472	1,522,472	194,005				
Gering and Fort Laramie irrigation district	52,944	2,250	1,686,775	1,741,969	213,792				
Goshen irrigation district	11,741	2,180	210,536	222,457	132,242				
Northport irrigation district	1,519	53	14,275	15,794	26,619				
Nevada: Newlands	52		21,833	21,938					
New Mexico: Carlsbad					16,963				6,949
New Mexico-Texas:									
Rio Grande	2,361	9,180	44,628	56,169	90,130				37,994
Elephant Butte irrigation district	2,281	8,850	14,882	26,013	48,674				20,721
El Paso County water improvement district No. 1	80	330	28,746	30,156	41,456				17,273
Oregon:									
Vale	167		412	579					
Umatilla			11,198	11,198					
East division			11,060	11,060					
West division			138	138					
Oregon-California:									
Klamath									
Main division			1,220,500	1,220,500					
Tule Lake division			1,083,500	1,083,500					
Trule Lake division			137,000	137,000					
South Dakota: Belle Fourche	571		16,694	17,265	87,044				
Utah:									
Strawberry Valley	1,169		34,168	35,337	40,634				
High Line division	7,102		22,653	23,355	11,024				
Mapleton division			3,010	3,010	5,191				
Spanish Fork division	467		5,719	6,186	20,969				
Springville division			2,786	2,786	3,450				
Washington:									
Okanogan			753	753					
Yakima	2,790		2,711,327	2,714,117					
Sunnyside division	2,790		2,294,538	2,297,328					
Tieton division			228,000	228,000					
Kititlan division			218,789	218,789					
Wyoming:									
Shoshone	143,113		427,535	570,648	44,131				
Garland division	133,846		397,154	531,000	34,272				
Frankie division	7,105		24,171	31,276	9,859				
Willwood division	2,162		6,210	8,372					
Riverton	107		650	757					
Total with Irrigation	776,508	954,430	12,554,452	14,378,945	1,043,789				78,924
Cropped without irrigation (yields on Milk River, Sun River, Lower Yellowstone and Klamath projects)	1,563		1,785	3,348	58				
Grand total	778,071	954,430	12,556,237	14,382,293	1,043,847				78,924

RECLAMATION TABLES 24-26.—Crop reports on Government reclamation projects in 1930—Continued

No. 26. VALUE

State and project	Cereals						Other grain and seed			
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed	Flaxseed	Total
Arizona: Salt River.....	\$113,467				\$224,845	\$338,312	\$231,637			\$231,637
Arizona-California:										
Yuma.....	2,693	\$110	\$632		13,927	17,362	439,480	\$125		439,605
Valley division.....	1,595		632		13,721	15,948	373,038			373,038
Reservation division.....	1,098	110			206	1,414	66,442	125		66,567
California: Orland.....	6,367	41,201	1,017		1,169	49,754				
Colorado:										
Grand Valley.....	45,371	29,228	3,471		14,166	46,865	1,134			1,134
Uncompaghere.....		109,533	41,784	\$537	124,623	321,848	2,960	15,900		18,860
Idaho:										
Boise.....	180,217	180,235	47,505	1,761	620,631	1,030,349	62,321	257,268	\$389	319,978
New York irrigation district.....	13,663	333	6,337		50,227	72,560	934	11,470	389	62,463
Nampa-Meridian irrigation district.....	46,865	30,499	13,159		130,694	221,217	9,096	53,052		62,148
Boise Kuna irrigation district.....	52,791	47,051	13,532		193,769	307,143	5,916	86,550		92,466
Wilder irrigation district.....	51,026	96,975	12,021	1,749	196,570	358,341	37,986	91,189		129,175
Big Bend irrigation district.....	571	2,171	1,196	12	5,772	9,722	8,779	2,308		11,087
Black Canyon irrigation district.....	13,301	3,206	1,260		43,599	61,366		12,699		12,699
King Hill.....	8,460	8,644	1,173		12,832	31,109	19,992	7,821		27,813
Minidoka.....	68,861	6,970	27,031	300	248,796	351,958	29,950	238,034		267,984
Gravity division.....	36,254	6,830	19,328	300	100,323	163,035	27,383	127,187		154,570
Pumping division.....	32,607	140	7,703		148,473	188,923	2,567	110,847		113,414
Montana:										
Hundley.....	34,647	4,183	15,896		14,800	69,526	8,998			8,998
Milk River.....	53,069	2,180	34,013	125	63,064	152,391	38,059	312	30,243	68,614
Malta division.....	6,274	876	3,642	125	11,732	22,649	20,448		889	21,337
Glasgow division.....			1,580		11,420	13,759	6,725			7,213
Chinook division.....	45,976	1,304	28,791		39,912	115,983	10,886	312	28,866	40,064
Sun River.....	27,871	952	19,923	150	154,744	203,640	2,448	1,683	5,666	9,797
Fort Shaw division.....	7,711	937	6,306	100	8,457	23,511	1,776	21	1,196	1,993
Greenfields and Big Coulee division.....	20,160	15	13,617	50	146,287	180,129		1,662	5,470	7,804
Montana-North Dakota:										
Lower Yellowstone.....	28,282	10,275	10,752	421	20,379	70,109	1,300	360	9,621	11,281
District No. 1.....	20,305	8,656	7,269	242	15,263	51,735		360	7,437	8,157
District No. 2.....	7,977	1,619	3,483	179	5,116	18,374	940		2,184	3,124

Nebraska-Wyoming:									
North Platte									
Pathfinder irrigation district	355, 140	294, 311	83, 014	3, 730	32, 585	768, 780	1, 611	5, 125	6, 736
Gering and Fort Laramie irrigation district	163, 265	172, 846	30, 772	2, 723	18, 141	383, 747	135	4, 363	4, 363
Goshute irrigation district	98, 107	53, 925	30, 541	90	12, 223	199, 886	144	132	267
Northport irrigation district	79, 639	23, 690	17, 274	67	9, 460	130, 130	1, 332	680	1, 462
Northport irrigation district	8, 129	38, 850	4, 427	850	2, 761	35, 017	24, 132		24, 132
Nebraska: Newlands	13, 860	4, 140		2, 640	92, 928	113, 568			
New Mexico: Carlsbad		1, 015		4, 730	1, 980	7, 725			
New Mexico-Texas:									
Rio Grande	4, 605	189, 656	4, 607		10, 067	208, 935	800		800
Elephant Butte irrigation district	4, 605	160, 387	3, 140		7, 124	175, 256	800		800
El Paso County water improvement district No. 1		29, 269	1, 467		2, 943	33, 679			
Oregon:									
Vale	819		2, 817		6, 600	10, 236			
Umatilla	102	6, 049	175		1, 158	7, 484		177	177
East division	102	2, 018			1, 784	3, 079			
West division		4, 031			374	4, 405			
Oregon-California:									
Klamath	20, 440		14, 304	3, 984	96, 228	134, 956		2, 640	2, 640
Main division	9, 080		4, 320	2, 448	43, 098	58, 946		2, 640	2, 640
Trule Lake division	11, 360		9, 984	1, 536	53, 130	76, 010			
South Dakota: Belle Fourche	80, 317	32, 829	44, 776	5, 308	35, 647	219, 077	1, 320	2, 748	13, 429
Utah:									
Strawberry Valley	25, 211	3, 689	12, 550		111, 723	153, 173			
High Line division	11, 075	2, 134	2, 866		35, 999	52, 064			
Mapleton division	1, 078	63	680		12, 740	14, 573			
Spanish Fork division	11, 952	588	7, 987		52, 679	73, 206			
Springville division	1, 106	904	1, 021		10, 299	13, 530			
Washington:									
Yakima	30, 317	119, 924	57, 374		217, 945	425, 560			
Sunnyside division	9, 256	109, 359	33, 986		132, 219	304, 820			
Tieton division	4, 944	10, 540	6, 160		15, 918	37, 562			
Kittitas division	16, 117	25	17, 228		49, 808	83, 178			
Wyoming:									
Shoshone	44, 424	1, 370	32, 690		31, 095	109, 579	1, 792	4, 492	6, 348
Garland division	36, 587	947	19, 277		24, 259	81, 070	300	4, 060	4, 424
Frankie division	3, 636	270	11, 285		4, 372	19, 563	1, 442	8, 946	1, 462
Willwood division	4, 201	153	2, 128		2, 464	8, 946	50	432	482
Riverton	46	180	1, 026	90	62	1, 404			
Total with irrigation	1, 144, 726	1, 066, 674	456, 530	23, 776	2, 151, 994	4, 843, 700	867, 934	536, 685	1, 450, 963
Total cropped without irrigation (Milk River, Sun River, Lower Yellowstone and Klamath projects)	112, 705	76, 003	1, 341	26, 492	122, 246	338, 787	2, 628	399	6

RECLAMATION TABLES 24-26.—Crop reports on Government reclamation projects in 1930—Continued

No. 26.—VALUE—Continued

State and project	Hay and forage						Vegetables and truck						
	Alfalfa hay	Clover hay	Other hay	Corn fodder	Other forage	Pasture	Total	Beans	Onions	White potatoes	Sweet pota- toes	Truck	Total
Arizona: Salt River	\$3, 628, 550		\$14, 974	\$213, 447	\$177, 560	\$1, 718, 760	\$5, 753, 291	\$66, 960		\$26, 438	\$79, 695	\$3, 475, 671	\$3, 648, 764
Arizona-California:													
Yuma	170, 223		39, 120		64, 262	41, 832	315, 437	398	\$33	2, 614	1, 052	299, 035	303, 132
Valley division	135, 555		32, 419		51, 633	35, 517	255, 124	23	33	2, 614	872	294, 100	297, 642
Reservation division	33, 568		6, 701		12, 629	6, 315	59, 213	375			180	4, 935	5, 490
Yuma auxiliary (Mesa)	1, 100						1, 100						
California: Orland	206, 848		4, 263	1, 496	2, 227	25, 281	240, 115	400				2, 100	2, 500
Colorado:													
Grand Valley	86, 163			8, 300	10, 015	8, 624	113, 102	109, 746		65, 633		25, 382	200, 761
Uncompahgre	363, 136		450	217	2, 715	41, 466	411, 312	43, 330	138, 313	344, 652		26, 342	522, 637
Idaho:													
Boise	1, 194, 000	71, 689	2, 529	14, 408	19, 915	457, 023	1, 759, 564	11, 630	54, 979	387, 270		47, 189	501, 068
New York irrigation district	113, 998	8, 469	1, 078	4, 556		75, 165	203, 266			560		4, 005	4, 565
Nampa Meridian irrigation district	252, 815	17, 730	671	4, 488		149, 405	425, 109		24, 806	72, 103		13, 467	110, 376
Boise Kuna irrigation district	323, 971	18, 611	630	1, 639		119, 345	464, 196		16, 660	70, 088		14, 971	101, 719
Wildier irrigation district	400, 407	22, 800	150	3, 725	19, 915	97, 398	544, 395	11, 630	13, 513	239, 397		12, 746	277, 286
Big Bend irrigation district	11, 979	1, 325				4, 700	18, 004			472		500	972
Black Canyon irrigation district	90, 830	2, 754				11, 010	104, 594			4, 650		1, 500	6, 150
King Hill	64, 141	3, 479	336	270		7, 815	76, 041	20, 452	593	20, 960		4, 945	46, 950
Minidoka	731, 392	42, 440	1, 482	2, 662	11, 988	144, 637	934, 601	224, 849	4, 800	888, 314		62, 447	1, 180, 410
Gravity division	489, 856	18, 600	1, 482	2, 310	11, 988	107, 783	632, 019	201, 351	3, 700	417, 514		43, 807	666, 372
Pumping division	241, 536	23, 840		352		36, 854	302, 582	23, 498	1, 100	470, 800		18, 640	514, 038
Montana:													
Huntley	140, 865	400	760	49		62, 818	204, 952	254, 230		5, 398		10, 562	270, 190
Milk River	197, 350	2, 472	105, 488	1, 008		7, 316	313, 634	3, 105	1, 159	116, 927		14, 685	135, 876
Malta division	74, 240		50, 526	464		4, 780	130, 010	12	655	20, 674		7, 030	28, 371
Glasgow division	41, 080		6, 109	20			47, 209					1, 005	2, 894
Chinook division	82, 030	2, 472	48, 853	524		2, 536	136, 415	3, 093	504	94, 364		6, 650	104, 611
Sun River	157, 811	10, 231	3, 262	466		11, 025	182, 795	923		23, 435		10, 210	34, 568
Fort Shaw division	70, 745	585	1, 772	466		2, 925	76, 493	815		20, 776		6, 865	28, 456
Greenfields and Big Coulee division	87, 066	9, 646	1, 490			8, 100	106, 302	108		2, 659		3, 345	6, 112
Montana-North Dakota:													
Lower Yellowstone	90, 153	1, 760	3, 654	904		7, 874	104, 345	46, 489		31, 053		12, 408	89, 950
District No. 1	70, 659	1, 278	1, 494	840		3, 381	77, 652	21, 242		22, 634		9, 638	53, 514
District No. 2	19, 494	482	2, 160	64		4, 493	26, 693	25, 247		8, 419		2, 770	36, 436

Nebraska-Wyoming:	518, 720	2, 670	13, 345	39, 750	574, 485	117, 162	709, 034	43, 150	1, 291, 085
North Platte	276, 711	1, 722	2, 628	15, 912	296, 973	37, 262	700, 967	23, 700	761, 929
Pathfinder irrigation district.....									
Gering and Fort Laramie irrigation district.....	144, 554	138	1, 408	7, 273	153, 373	63, 533	1, 125	9, 100	396, 542
Goshen irrigation district.....	79, 911	546	9, 087	14, 227	103, 489	14, 089	90	8, 150	121, 281
Northport irrigation district.....	17, 544	222	2, 222	2, 338	20, 650	2, 278	6, 852	2, 200	11, 330
Nevada: Newlands.....	704, 053		970	68, 926	773, 949	1, 55	45	27, 606	54, 006
New Mexico: Carlsbad.....	232, 033	1, 500	5, 520	1, 700	242, 698			235	235
New Mexico-Texas:									
Rio Grande.....	1, 391, 774		23, 817	31, 542	1, 508, 049	7, 121	9, 832	257, 275	322, 172
Elephant Butte irrigation district.....	687, 211		4, 339	18, 893	750, 668	6, 737	9, 535	80, 605	120, 233
El Paso County Water Improvement District No. 1.....	704, 563		19, 478	12, 649	757, 381	384	297	176, 670	201, 939
Oregon:									
Vale.....	380		2, 007	2, 025	5, 141	40		1, 463	1, 812
Umatilla.....	124, 487	72	3, 507	37, 643	172, 425	472		22, 716	35, 856
East division.....	81, 600		1, 850	28, 539	117, 929			17, 219	26, 067
West division.....	42, 887	72	1, 657	9, 104	54, 496	472		5, 497	9, 789
Oregon-California:									
Klamath.....	353, 700	2, 610	35, 490	225, 066	616, 866			32, 710	948, 085
Main division.....	191, 700	2, 610	25, 410	192, 598	412, 318			812, 625	839, 145
Tule Lake division.....	162, 000		10, 080	32, 468	204, 548			6, 190	108, 940
South Dakota: Belle Fourche.....	177, 176	3, 232	13, 457	51, 308	274, 493	1, 999		36, 019	63, 059
Utah:									
Strawberry Valley.....	319, 529	2, 492	3, 181	31, 581	356, 783	2, 804		56, 169	70, 932
High Line division.....	139, 907		1, 309	14, 336	175, 749	1, 084		16, 496	26, 109
Mapleton division.....	32, 989		28	2, 324	35, 430			6, 136	7, 190
Spanish Fork division.....	100, 880		2, 165	10, 733	115, 485	1, 120		23, 951	27, 073
Springville division.....	25, 844		130	3, 928	30, 099			9, 586	10, 560
Washington:									
Okanogan.....	525		1, 350	3, 435	3, 435			5, 577	6, 029
Yakima.....	974, 032	47, 785	40, 683	326, 535	1, 389, 933	5, 580		302, 011	1, 547, 384
Sunnyside division.....	815, 080	17, 592	36, 548	273, 760	1, 142, 980	5, 580		293, 191	1, 317, 813
Tieton division.....	72, 160	4, 135	4, 345	30, 450	111, 449			4, 000	106, 600
Kittitas division.....	86, 792		25, 489	22, 325	134, 606			4, 820	122, 971
Wyoming:									
Shoshone.....	98, 128	2, 462	1, 033	44, 750	146, 463	369, 303		18, 165	641, 572
Garland division.....	69, 990	2, 096	699	31, 576	104, 361	352, 004		10, 358	600, 654
Frankie division.....	22, 668	168	304	11, 361	34, 501	12, 434		7, 467	31, 977
Willwood division.....	3, 470	198	90	1, 813	7, 001	4, 865		3, 560	8, 943
Riverton.....	3, 544	1, 110	281	1, 785	6, 750	209		1, 555	2, 154
Total with irrigation.....	11, 928, 718	149, 515	326, 402	3, 397, 062	16, 479, 761	1, 287, 357	918, 788	4, 820, 721	11, 951,

RECLAMATION TABLES 24-26.—*Crop reports on Government reclamation projects in 1930*—Continued

No. 26. VALUE—Continued

State and project	Fruit and nuts						Miscellaneous				Grand total		
	Apples	Peaches	Pears	Prunes	Citrus fruit	Small fruit	Miscellaneous	Total	Sugar beets	Cotton		Other	Total
Arizona: Salt River					\$1,376,280	\$250,505	\$1,825,453	\$3,452,238		\$3,103,152	\$12,920	\$3,116,072	\$16,540,314
Arizona-California:													
Yuma			\$175		131,935	24,056	150,869	307,035		1,538,454	72,995	1,611,449	2,994,020
Valley division			175		1,620	7,656	150,319	159,770		1,284,112	67,768	1,351,880	2,453,402
Reservation division					3,525	16,175	550	20,250		254,342	3,727	258,069	411,003
Yuma auxiliary (Mesa)					126,790	225		127,015			1,500	128,515	123,615
California: Orland	\$1,133	\$12,879	440	\$18,797	52,800	76,581	115,776	278,406			7,931	7,931	578,706
Colorado:													
Grand Valley		18,363						18,363	\$75,822		16,138	91,960	472,185
Uncompahgre	18,021	1,736				10,369		30,126	225,424		46,043	271,467	1,606,250
Idaho:													
Boise	277,159		1,780	90,145		10,752		379,836			67,024	67,024	4,057,819
New York irrigation district	14,884			17,427		2,471		34,782			1,872	1,872	326,977
Nampa Meridian irrigation district	94,846			16,835				111,681			25,014	25,014	958,016
Boise Kuna irrigation district	86,029			4,089		3,459		93,577			18,141	18,141	1,077,242
Wildier irrigation district	81,400		1,780	51,794		4,822		139,796			21,997	21,997	1,470,990
Big Bend irrigation district													39,785
Black Canyon irrigation district													184,809
King Hill	10,389			1,494		707	2,856	15,446			573	573	197,932
Minidoka	1,960							1,960	469,222		149	469,371	3,206,284
Gravity division	1,960							1,960	219,405		149	219,554	1,837,510
Pumping division									249,817			249,817	1,368,774
Montana:													
Hundley									556,837			556,837	1,110,523
Milk River									288,770		100	288,870	959,385
Malta division									87,875			87,875	290,243
Glasgow division									503			503	71,577
Chinook division									200,392		100	200,492	597,565
Sun River									3,486			3,486	442,918
Fort Shaw division									3,367			3,367	133,820
Greenfields and Big Coulee division									119			119	306,098
Montana-North Dakota:													
Lower Yellowstone						130		130	665,555		16,386	681,941	957,756
District No. 1						130		130	496,454		9,585	506,039	697,227
District No. 2									169,101		6,801	175,902	290,529

RECLAMATION TABLE 27.—*Summary of livestock and equipment on Federal irrigation projects, 1930*

	Number	Value	
		Each	Total
Horses.....	69,953	\$48.24	\$3,278,817
Mules.....	10,085	80.00	822,597
Beef cattle.....	65,368	41.78	2,731,223
Purebred sires.....	682	99.18	67,639
Scrub sires.....	192	46.00	8,870
Dairy cattle.....	137,570	63.36	8,715,381
Purebred sires.....	1,485	126.08	187,227
Scrub sires.....	1,038	52.14	54,722
Sheep.....	462,774	5.20	2,407,406
Hogs.....	78,404	8.80	689,513
Brood sows.....	12,026	19.49	234,474
Goats.....	480	5.00	2,354
Rabbits.....	1,900	1.18	2,243
Fowls.....	2,116,481	0.95	2,016,163
Bees (hives).....	36,312	5.64	204,980
Total stock value.....			21,423,609
Value of equipment.....			¹ 15,900,155
Motor vehicles.....			8,622,337
Other equipment.....			7,277,818
Total stock and equipment.....			37,323,764
Increase or decrease in value over 1929:			
Stock.....			-4,943,581
Equipment.....			-943,979
Total decrease.....			-5,887,560

¹ Value of equipment on Salt River project estimated.

RECLAMATION TABLE 28.—Inventory of livestock and equipment on reclamation project farms at close of 1930 ¹

State and project	Horses			Mules		Beef							
	Num-ber	Value		Num-ber	Value		Cattle		Purebred sires		Scrub sires		
		Each	Total		Each	Total	Num-ber	Value		Num-ber	Value		
								Each	Total		Each	Total	Each
Arizona: Salt River.....	6,384	\$70.00	\$446,880	3,187	\$95.00	\$302,765	13,129	\$90.00	\$787,740				
Arizona-California:													
Yuma.....	2,166	52.30	113,235	1,160	80.34	93,195	365	37.69	13,760	1	\$100.00	\$100	
Valley and reservation divisions.....	2,141	51.87	111,060	1,146	80.23	91,945	365	37.69	13,760	1	100.00	100	
Auxiliary (Mesa).....	25	87.00	2,175	14	89.30	1,250							
California: Orland.....	679	48.56	32,975				361	28.27	10,204				
Colorado:													
Grand Valley.....	981	47.68	46,783	43	81.74	3,515	62	26.85	1,665				
Uncompahgre.....	4,270	36.73	156,836	217	42.00	9,110	4,874	32.50	158,395	67	85.60	5,735	\$650
Idaho:													
Boise.....	7,887	43.44	342,588	146	48.53	7,085	2,876	36.71	105,560	36	92.36	3,325	20
New York irrigation district.....	656	41.05	26,930	3	25.00	75	381	35.56	13,550	4	93.75	375	3
Boise-Kuna irrigation district.....	2,288	45.42	103,950	35	43.60	1,525	461	32.86	15,147	9	102.80	925	50
Nampa Meridian irrigation district.....	1,842	47.74	87,937	25	50.40	1,260	970	42.98	42,073	10	97.50	975	2
Wildier irrigation district.....	2,661	39.82	105,971	70	51.00	3,570	1,055	32.98	34,794	12	83.33	1,000	14
Big Bend irrigation district.....	91	40.88	3,720	3	38.33	115				1	50.00	50	
Black Canyon irrigation district.....	349	40.34	14,080	10	54.00	540	284	30.00	8,520	6	120.00	720	2
King Hill.....	455	37.30	17,063	65	79.00	5,135	401	34.31	13,760	6	79.17	475	5
Mindoka.....	5,407	39.00	210,236	76	50.20	3,815	338	33.83	11,435	6	79.17	475	5
Gravity division.....	3,192	34.13	108,946	68	46.54	3,165	63	36.90	2,325				
Pumping division.....	2,215	45.73	101,290	8	81.25	650							
Montana:													
Huntley.....	1,813	34.70	62,900	45	64.00	2,880	1,568	41.86	65,615				
Milk River.....	2,266	41.63	94,342	83	50.78	4,215	7,051	39.43	278,061	60	190.17	11,410	11
Malta and Glasgow divisions.....	1,178	43.59	51,355	60	51.17	3,070	4,460	44.42	198,125	51	195.10	9,950	4
Chinook division.....	1,088	39.51	42,987	23	49.78	1,145	2,591	30.85	79,936	9	162.00	1,460	335
Sun River.....	1,208	33.08	39,965	5	45.00	225	2,365	39.30	92,950	30	116.83	3,505	7
Fort Shaw division.....	1,480	33.36	16,015	3	50.00	150	2,434	53.52	23,280	9	102.77	925	5
Greenfields and Big Coulee division.....	728	32.90	23,950	2	37.50	75	1,931	36.11	69,720	21	122.86	2,580	4
Montana-North Dakota:													
Lower Yellowstone.....	1,758	34.51	60,675	43	51.16	2,200	1,556	37.49	58,335	24	130.83	3,140	5
District No. 1.....	1,212	34.38	41,665	27	44.44	1,200	1,107	39.66	43,905	15	130.00	1,950	10
District No. 2.....	546	34.82	19,010	16	62.50	1,000	1,449	32.14	14,430	9	132.22	23	3

¹ Data are for calendar year except on Salt River project, where data are for corresponding "agricultural year," October, 1929, to September, 1930.

RECLAMATION TABLE 28.—*Inventory of livestock and equipment on reclamation-project farms at close of 1930—Continued*

State and project	Horses			Mules			Beef								
	Num-ber	Value		Num-ber	Value		Cattle		Purebred sires		Scrub sires				
		Each	Total		Each	Total	Num-ber	Value		Num-ber	Value				
								Each	Total		Each	Total	Each	Total	
Nebraska-Wyoming:	8, 209	\$39. 59	\$324, 755	617	\$71. 32	\$44, 005	6, 483	\$30. 38	\$196, 945	152	\$78. 32	\$11, 905	42	\$42. 14	\$1, 770
North Platte.....	4, 070	35. 00	142, 450	312	75. 00	23, 400	4, 003	30. 00	120, 090	126	75. 00	9, 450	33	40. 00	1, 320
Pathfinder irrigation district.....															
Gering and Fort Laramie irrigation dis- trict.....	1, 816	49. 22	89, 385	171	81. 31	13, 905	759	33. 23	25, 225	10	95. 50	955			
Goshen irrigation district.....	1, 667	40. 00	66, 680	92	50. 00	4, 600	1, 296	30. 00	38, 880	11	100. 00	1, 100	4	50. 00	200
Northport irrigation district.....	4, 656	40. 20	26, 240	42	50. 00	2, 100	425	30. 00	12, 750	5	80. 00	400	5	50. 00	250
Nevada: Newlands.....	4 2, 762	47. 71	131, 782				4, 964	42. 95	213, 186						
New Mexico: Carlsbad.....	841	80. 09	67, 355	519	88. 57	45, 970	3, 256	30. 63	99, 725						
New Mexico-Texas:															
Rio Grande.....	5, 549	55. 47	307, 813	3, 343	80. 73	269, 880	467	32. 56	15, 207	11	147. 73	1, 625	6	85. 00	510
El Paso County water improvement district No. 1.....	2, 063	68. 06	140, 409	1, 706	88. 28	150, 615	94	52. 65	4, 950	3	133. 33	400			
Elephant Butte irrigation district.....	3, 486	48. 02	167, 404	1, 637	72. 85	119, 265	373	27. 49	10, 257	8	153. 12	1, 225	6	85. 00	510
Oregon:															
Vale.....	127	43. 65	5, 543	4	87. 50	350	16	25. 00	400						
Umatilla.....	790	19. 625	15, 625	27	30. 00	810	166	25. 64	4, 255				3	41. 66	125
East division.....	425	25. 40	10, 795	21	32. 00	670	88	27. 44	2, 415						
West division.....	365	24. 20	8, 830	6	23. 33	140	78	23. 60	1, 840				3	41. 66	125
Oregon-California:															
Klamath.....	1, 938	65. 52	126, 984	27	41. 20	1, 112	3, 555	43. 80	155, 656	64	107. 50	6, 880	26	64. 00	1, 660
Main division.....	1, 431	65. 00	93, 015	19	40. 00	760	3, 364	44. 00	148, 016	60	108. 00	6, 480	25	64. 00	1, 600
Tule Lake division.....	1, 507	67. 00	33, 969	8	44. 00	352	191	40. 00	7, 640	4	100. 00	400	1	60. 00	60
South Dakota: Belle Fourche.....	2, 409	31. 94	76, 933	46	58. 91	2, 710	3, 305	36. 54	120, 749	22	149. 09	3, 280	51	29. 22	1, 490
Utah:															
Strawberry Valley.....	2, 888	50. 00	144, 400				4, 947	40. 00	197, 880	183	75. 00	13, 725			
High Line division.....	1, 076	50. 00	53, 800				25, 080	40. 00	95, 080	12	75. 00	900			
Mapleton division.....	1, 237	50. 00	11, 850				249	40. 00	9, 960	12	75. 00	900			
Spanish Fork division.....	1, 369	50. 00	68, 450				3, 456	40. 00	138, 240	124	73. 00	9, 300			
Springville division.....	2, 206	50. 00	10, 300				615	40. 00	24, 600	35	73. 00	2, 625			
Washington:															
Okanogan.....	172	27. 93	4, 804	9	35. 00	315	28	20. 71	580						
Yakima.....	7, 121	49. 07	348, 984	316	52. 00	16, 435	1, 371	38. 02	53, 006	20	90. 70	1, 814	4	40. 00	40
Sunnyside division.....	5, 318	46. 91	249, 513	258	52. 90	13, 650	677	33. 12	25, 741	6	50. 00	300	1	40. 00	40
Tieton division.....	1, 206	47. 28	57, 017	50	47. 90	2, 385	93	33. 12	3, 080						
Kittitas division.....	1, 597	71. 11	42, 454	8	48. 75	390	601	40. 24	24, 185	14	108. 14				

RECLAMATION TABLE 28.—Inventory of livestock and equipment on reclamation-project farms at close of 1930—Continued

State and project	Dairy						Sheep			Hogs							
	Cattle			Purebred sires			Scrub sires			Value		Number		Valte		Brood sows	
	Num-ber	Value		Num-ber	Value		Num-ber	Value		Num-ber	Each	Total	Num-ber	Each	Total	Num-ber	Value
		Each	Total		Each	Total		Each	Total								
Arizona: Salt River	30,311	\$70.59	\$2,139,763							41,776	\$7.00	\$292,432	5,593	\$11.00	\$61,523		
Arizona-California:																	
Yuma	996	86.93	86,585	18	\$122.22	\$2,200	8	\$70.00	\$560	2,614	4.95	12,959	801	10.27	8,229	65	\$26.23
Valley and reservation divisions	996	86.93	86,585	16	121.87	1,950	8	70.00	560	2,614	4.95	12,959	801	10.27	8,229	65	26.23
Auxiliary (Mesa)				2	125.00	250											
California: Orland	3,487	83.62	291,565	104	110.09	11,450	44	60.59	2,710	3,078	7.79	23,968	760	10.71	8,137	217	29.43
Colorado:																	
Grand Valley	1,001	52.58	52,640							1,418	4.43	6,281	1,125	8.29	9,332		
Uncompahgre	4,829	46.42	224,183	52	98.75	5,135	47	47.76	2,245	12,380	5.20	64,287	7,106	7.18	51,033	1,189	16.40
Idaho:																	
Boise	24,488	62.07	1,519,930	399	99.75	39,800	319	46.48	14,827	24,553	5.13	125,866	12,948	8.08	104,642	3,207	21.32
New York irrigation district	3,338	56.73	189,381	41	90.12	3,695	42	47.62	2,000	2,603	5.83	15,174	647	7.94	5,134	114	22.40
Boise-Kuna irrigation district	8,228	56.90	468,158	114	95.92	10,935	126	51.86	6,534	5,230	4.84	25,296	4,120	7.86	32,378	965	23.88
Nampa-Meridian irrigation district	7,298	74.44	543,294	147	109.08	16,035	100	50.18	5,018	4,808	7.04	33,860	2,053	8.38	17,200	714	21.03
Wilder irrigation district	4,833	56.71	274,071	83	94.16	7,815	51	25.00	1,275	10,254	4.36	44,719	4,675	8.58	40,094	987	20.74
Big Bend irrigation district	233	53.87	12,551	8	93.75	750				1,666	3.69	4,452	223	7.52	1,678	39	20.64
Black Canyon irrigation district	558	58.20	32,475	6	95.00	570				1,206	4.27	5,151	1,230	6.63	8,158	388	17.00
King Hill	909	50.00	45,450	18	110.00	1,980	7	35.00	245	965	4.00	3,860	485	9.30	4,510	127	22.00
Mindoka	7,958	54.30	431,935	64	73.00	4,670	32	39.38	1,260	22,666	5.00	111,689	5,211	7.85	40,904	1,193	16.71
Gravity division	4,727	47.93	226,585	43	64.65	2,780	32	39.38	1,260	14,836	4.72	70,012	2,190	8.33	18,249	382	16.82
Pumping division	3,231	63.55	205,350	21	90.00	1,890				7,530	5.32	41,677	3,021	7.50	22,655	801	16.66
Montana:																	
Huntley	1,986	47.00	93,345							6,889	3.94	27,124	1,657	10.59	17,534		
Milk River	2,549	51.17	130,428	19	169.00	3,210	28	31.80	890	81,996	4.71	386,599	3,085	10.10	31,157	662	17.32
Malta and Glasgow divisions	928	70.61	65,530	11	206.82	2,275	3	63.33	190	40,813	5.14	210,690	986	11.60	11,434	76	18.47
Chinook division	1,621	40.03	64,898	8	116.87	935	25	28.00	700	41,183	4.27	175,909	2,099	9.39	19,723	586	17.17
Sun River	1,401	54.74	76,735	19	90.80	1,725	15	58.70	880	21,955	3.97	87,133	1,541	9.40	14,470	354	22.11
Fort Shaw division	756	53.42	40,390	9	80.56	725	10	54.50	545	2,951	4.49	13,245	4,471	8.99	4,232	75	24.73
Greenfields and Big Coulee division	645	56.35	36,345	10	100.00	1,000	5	67.00	335	19,004	3.89	73,888	1,070	9.57	10,238	279	21.41
Montana-North Dakota:																	
Lower Yellowstone	1,696	40.43	68,571	13	100.00	1,300	6	50.00	300	8,099	4.73	38,279	3,442	9.06	31,196	450	17.98
District No. 1	1,256	41.32	51,897	12	102.08	1,225	2	50.00	100	13,146	4.71	13,146	2,014	8.77	17,601	259	18.42
District No. 2	440	37.89	16,674	1	75.00	75	4	50.00	200	5,307	4.74	25,133	1,428	9.48	13,535	191	17.36

RECLAMATION TABLE 28.—Inventory of livestock and equipment on reclamation project farms at close of 1930—Continued

State and project	Fowls			Bees (hives)			Total stock value	Value of equip- ment		Total stock and equip- ment	Increase or decrease in value over 1929		
	Number	Value		Num- ber	Value			Motor vehicles	Other		Stock	Equip- ment	Total
		Each	Total		Each	Total							
Arizona: Salt River	333,860	\$1.00	\$328,117	9,274	\$5.00	\$46,370	\$4,405,590	\$825,000	\$1,250,000	\$5,655,590	-\$1,286,356	-\$250,000	-\$1,536,356
Arizona-California:													
Yuma	45,048	.97	43,585	2,620	5.12	13,416	389,529	419,185	320,232	739,417	-41,609	-37,390	-78,999
Valley and reser ation divisions	43,537	.97	42,602	2,620	5.12	13,416	384,871	391,285	307,302	698,587	-40,006	-35,966	-75,966
Auxiliary (Mesa)	1,511	.65	983				4,658	27,900	12,930	40,830	-1,603	-1,430	-3,033
California: Orland	83,791	1.89	158,541	701	4.73	3,318	549,354	168,205	117,170	285,375	-77,785	13,440	-62,345
Colorado:													
Grand Valley	22,165	.81	17,914	52	3.03	158	138,288	69,780	48,735	118,515	-43,705	13,975	-29,730
Uncompahgre	98,636	.69	68,612	1,220	3.20	3,909	769,614	298,009	324,944	622,953	-169,903	-27,328	-197,231
Idaho:													
Boise	252,305	.80	201,028	1,009	2.20	2,220	2,536,079	689,268	371,725	1,060,993	-96,188	113,078	16,890
New York irrigation district	18,101	.91	16,481	45	3.84	173	275,706	60,865	6,577	67,442	-18,699	-17,117	-35,816
Boise-Kuna irrigation district	67,516	.86	58,010	436	1.45	633	746,585	177,324	184,731	362,055	-61,976	80,925	18,949
Nampa Meridian irrigation district	69,116	.91	62,873	369	2.60	959	826,627	173,719	78,080	253,799	-63,802	40,304	106,306
Wildir irrigation district	86,290	.68	58,370	159	2.86	455	593,056	241,460	-65,252	306,712	-94,898	-40,078	-134,976
Big Bend irrigation district	2,807	.81	2,267				23,602	4,425	2,075	6,500	-2,837	-2,330	-5,167
Black Canyon irrigation district	8,505	.35	3,027				70,303	29,475	35,010	64,485	16,420	32,495	48,915
King Hill	13,664	.86	11,751	470	4.50	2,115	104,218	34,375	45,132	79,507	-13,690	7,808	-5,822
Mindoka	78,494	.66	51,840	617	4.60	2,836	893,465	458,500	254,712	713,212	-212,490	54,475	-158,015
Gravity division	39,431	.59	23,105	442	4.43	1,961	474,668	317,500	99,642	367,142	-148,504	9,390	-139,114
Pumping division	39,063	.73	28,735	175	5.00	875	418,797	141,000	205,070	346,070	-63,986	45,085	-18,901
Montana:													
Huntley	25,904	.68	17,632	1,180	9.95	11,745	298,775	131,190	178,200	309,390	-21,467	-17,367	-38,834
Milk River	26,171	.85	22,323	170	8.56	1,456	976,305	144,165	306,522	450,687	-383,234	3,367	-379,867
Malta and Glasgow divisions	14,730	1.01	14,869	158	13.50	1,396	570,700	113,275	155,420	268,695	-241,235	-19,299	-260,534
Chinook division	11,441	.65	7,454	12	5.00	60	405,605	30,890	151,102	181,992	-141,999	22,666	-119,333
Sun River	27,374	.87	23,734	516	4.90	2,530	352,286	125,815	136,500	262,315	-99,942	4,605	-104,547
Fort Shaw division	14,675	.99	14,581	515	4.90	2,525	118,743	33,830	37,075	72,905	-32,062	-1,250	-33,312
Greenfields and Big Coulee division	12,699	.72	9,153	1	5.00	5	233,543	99,985	99,425	189,410	-67,880	-3,355	-71,235
Montana-North Dakota:													
Lower Yellowstone	32,625	.47	15,397	722	7.71	5,570	293,282	122,075	187,815	309,890	-71,427	49,015	-22,412
District No. 1	15,890	.63	10,011	661	7.89	5,215	192,847	84,268	83,165	167,370	-50,692	-6,220	-56,912
District No. 2	16,735	.32	5,386	61	5.82	355	100,435	37,870	104,650	142,520	-20,735	55,235	34,500
Nebraska-Wyoming:													
North Platte	159,086	.61	97,996	946	3.38	3,205	1,251,455	1,115,339	853,281	1,968,620	-192,911	126,837	-66,074
Pathfinder irrigation district	91,176	.62	56,651	671	2.50	1,617	656,833	591,600	574,220	1,135,820	-122,405	292,705	170,330

(ering and Fort Laramie irrigation district.....	32,337	.57	18,542	90	4.12	371	261,026	262,720	194,246	450,975	718,001	-71,916	-89,148	-161,064
Goshen irrigation district.....	27,921	.63	17,624	123	5.00	615	246,887	262,620	45,475	308,095	554,982	-8,036	-56,815	-64,851
Northport irrigation district.....	7,652	.68	5,179	86	7.00	602	86,709	28,390	39,340	67,730	104,439	9,446	-19,905	-10,459
Nevada: Newlands.....	124,546	1.33	193,438	3,800	5.78	21,964	1,258,110	167,810	307,555	482,370	1,740,449	-181,416	-32,028	-213,444
New Mexico: Carlisbad.....	19,419	1.42	27,477	974	9.14	8,905	208,127	179,735	131,410	301,470	569,267	16,109	-52,295	-36,186
New Mexico: Texas: Rio Grande.....	176,125	1.02	179,165	1,025	6.63	6,708	1,464,480	1,032,578	752,510	1,805,988	3,269,568	-223,907	107,864	-116,043
El Paso County water improvement district No. 1.....	100,864	1.06	107,375	299	5.82	1,743	793,046	654,408	374,222	1,028,630	1,821,676	-143,189	39,513	-103,676
Elephant Butte irrigation district.....	75,261	.95	71,790	726	6.96	5,055	671,434	398,170	378,288	776,458	1,447,892	-80,718	68,351	-12,367
Oregon:														
Vale.....	1,897	1.47	2,805	20	6.25	125	18,057	11,600	5,040	16,640	34,697	18,057	16,640	6 34,697
Umatilla.....	54,345	1.35	73,520	1,392	6.38	9,162	227,214	51,625	56,365	107,900	435,204	-96,975	-33,594	-130,599
Past division.....	42,250	1.33	56,450	809	6.53	5,302	212,041	35,045	37,930	72,975	285,016	-62,116	-15,470	-77,586
West division.....	12,095	1.41	17,070	583	6.62	3,860	115,173	16,580	18,455	33,015	150,188	-34,859	-18,124	-52,983
Oregon-California:														
Klamath.....	68,380	1.16	79,394	229	6.05	1,384	1,093,578	319,000	288,000	607,000	1,700,578	-341,236	23,200	-318,036
Main division.....	53,240	1.15	61,226	168	6.00	1,109	833,832	229,000	222,000	451,000	1,284,832	-182,113	10,500	-171,613
Tule Lake division.....	15,140	1.20	18,168	61	4.50	275	259,746	99,000	66,000	156,000	415,746	-159,123	12,700	-136,423
South Dakota: Belle Fourche.....	43,217	.89	38,580	2,809	7.34	20,618	794,757	249,150	186,555	435,705	1,230,462	-577,840	-55,943	-633,783
Utah:														
Strawberry Valley.....	124,956	.50	62,478	811	5.00	4,055	845,506	191,200	181,495	372,695	1,218,201	-396,192	-1,026,085	-1,422,277
High Line division.....	48,637	.50	24,318	661	5.00	3,305	274,448	69,000	70,535	139,535	413,983	86,779	---	---
Mapleton division.....	11,875	.50	5,937	---	---	---	45,004	25,900	15,875	41,775	86,779	---	---	---
Spanish Fork division.....	35,344	.50	17,672	150	5.00	750	448,909	82,901	85,385	168,286	617,195	---	---	---
Springville division.....	29,100	.50	14,550	---	---	---	77,145	13,100	10,000	23,100	100,244	---	---	---
Washington:														
Okanogan.....	5,826	.82	4,794	62	5.45	338	25,137	66,270	149,658	215,928	241,065	-19,568	-63,719	-83,287
Yakima.....	232,431	1.01	257,258	3,573	5.72	20,453	1,972,606	1,777,798	1,78,767	2,956,565	4,939,171	-253,327	152,706	-100,621
Sunnyside division.....	201,078	1.05	210,554	3,372	5.82	19,637	1,551,399	1,234,186	808,889	2,043,075	3,934,474	-397,231	177,663	-379,663
Tieton division.....	44,069	.92	40,377	197	4.06	800	224,978	477,849	301,584	779,433	1,004,411	-52,325	1,081	-51,244
Kittitas division.....	7,294	.87	6,327	4	4.00	16	196,229	65,763	68,294	134,057	330,286	10 196,229	134,057	330,286
Wyoming:														
Shoshone.....	45,010	.83	37,401	2,120	5.81	12,330	359,300	148,565	409,125	768,425	1,081,255	-168,146	-30,145	-198,291
Garland division.....	32,061	.83	26,451	1,560	6.47	10,690	250,606	105,060	195,280	300,530	580,036	-73,049	-8,360	-83,409
Frankie division.....	9,973	.88	8,856	548	4.00	2,192	94,814	34,575	54,350	88,325	133,739	-89,307	-16,155	-105,462
Willwood division.....	2,976	.70	2,094	12	4.00	48	13,880	8,940	10,980	19,570	33,750	-3,790	-5,630	-9,420
Riverton.....	1,206	---	1,323	---	---	---	12 8,497	9,100	9,935	19,035	27,532	-8,433	2,055	-6,378
Total and averages.....	2,116,481	---	2,016,163	36,312	5.64	204,980	21,423,609	8,622,337	7,277,818	15,900	155,37,323,764	-4,943,581	-943,979	-5,887,560

¹ Data are for calendar year except on Salt River project, where data are for corresponding "agricultural year," October, 1929 to September, 1930.

² Equipment on Salt River project estimated.

³ Includes \$100, the value of 11 goats.

⁴ Includes \$2,204, the value of 459 goats, 71 of which, valued at \$1,994 were reported on the New Mexico division.

⁵ The 1930 stock yield and equipment report was the first received from Vale project.

⁶ Includes \$2,243, the value of 1,900 rabbits.

⁷ Includes \$1,944, the value of 1,440 rabbits.

⁸ Includes \$299, the value of 460 rabbits.

⁹ The inventory for the year 1930 was the first inventory taken on the Kittitas division.

¹⁰ Includes \$30, the value of 10 milk goats.

RECLAMATION TABLE 29.—*Projects turned over to water users' organizations for operation and maintenance*

Project	Year	Remarks
Salt River project, Arizona.....	1917	Association operating entire project.
Boise project, Idaho.....	1926	United States operating reserved works; board of control operating transferred works.
King Hill project, Idaho.....	1926	District operating entire project.
Minidoka project, Idaho:		
Gravity division.....	1917	United States operating reserved works.
South side pumping division.....	1926	Do.
Huntley project, Montana.....	1928	District operating entire project.
Sun River project, Montana:		
Fort Shaw division.....	1927	} Do.
Greenfields division.....	1931	
North Platte project, Nebraska-Wyoming:		
Interstate division.....	1926	United States operating reserved works.
Northport division.....	1927	Do.
Fort Laramie division.....	1927	Do.
Newlands project, Nevada.....	1927	District operating entire project.
Umatilla project, Oregon.....	1926	Districts operating entire project, except McKay Reservoir.
Strawberry Valley project, Utah.....	1927	Association operating entire project.
Okanogan project, Washington.....	1929	District operating entire project.
Shoshone project, Wyoming:		
Garland division.....	1927	United States operating reserved works.
Frannie division.....	1930	

RECLAMATION TABLE 30.—*Projects to be turned over to water users' organizations for operation and maintenance*

Project	Year	Remarks
Grand Valley project, Colorado.....	1937	Contract executed.
Uncompahgre project, Colorado.....	1932	Do.
Milk River project, Montana.....	1936	Certain works to be reserved.
Lower Yellowstone project, Montana-North Dakota.	1932	Contracts executed. Entire project will be transferred.
Vale project, Oregon.....	-----	Project will be transferred upon completion of construction.
Owyhee project, Oregon-Idaho.....	-----	Do.
Belle Fourche project, South Dakota.....	1934	Contract executed. Entire project will be transferred.
Salt Lake Basin project, Utah: First division.	1932	Contract executed.
Yakima project, Washington: Kittitas division.	1932	Do.



